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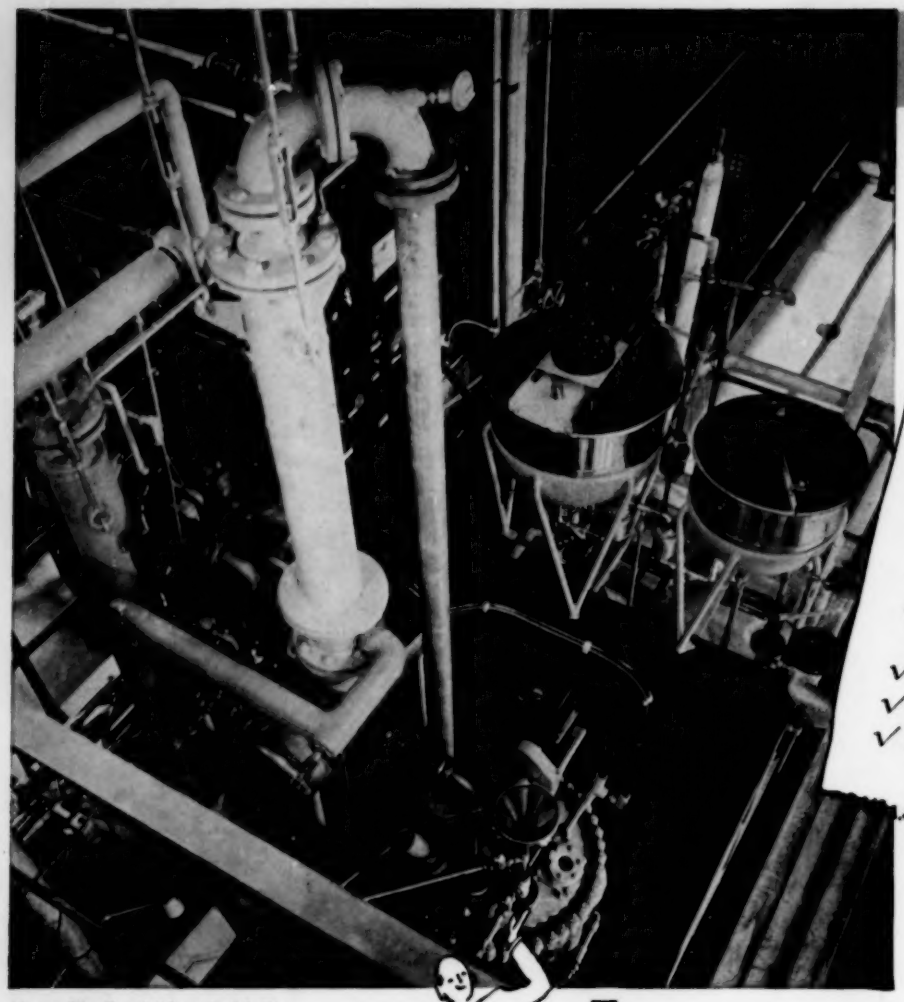

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The Food Technologist in Relation to Advanced Engineering in Food Processing Equipment[a]

Any marked advance in the design and construction of equipment for a given food processing operation or product will often involve changes in operation that will affect the character of the finished product. It may improve it; or damage it; or, it may not alter it at all.

It is very dangerous to make a radical change in equipment or its operation on a full production scale without first determining by laboratory and pilot scale tests how the change is apt to affect plant procedures and quality of product. After the data from such preliminary studies are in hand it is also essential to closely follow the behavior of the food product when processed on a commercial scale with the new equipment of advanced engineering design. In other words the engineer and the food technologist should cooperate.

It might be well at this point to mention some of the possible hazards and problems that might arise when advanced food engineering is applied in a food processing establishment; and indicate some of the advantages of advanced engineering from the technological point of view. The new advanced equipment may give a lower yield of product; for example, a peeling machine of revolutionary design might peel potatoes and apples too deeply; a new rice polishing machine might lose too much of the kernel in the polishings. It might lower quality in some manner; for example a fruit grader of new design might have tremendous capacity but bruise or lacerate the fruit. If it is a heat treating device it might sterilize the product but not inactivate enzymes (until the technologist has determined what changes in operation are needed), or, it might inactivate enzymes and sterilize, but tend to scorch the product by local overheating. If it uses a special form of energy such as ultrasonic vibrations, X-rays, or ultraviolet rays, the flavor, clarity, odor or vitamin content of the food may be affected adversely. The new equipment may favor overoxidation. It may be so costly to install that it can never pay its way.

On the other hand there are usually more advantages or benefits than hazards in advanced engineering, because usually the engineer consults the technologist as he is working on his designs and specifications and tries to foresee and eliminate objectionable or hazardous features. The advanced equipment often speeds production at lower cost by conserving man power and mechanizing operations. It often results in better quality, as did flash pasteurization of some food products. It often adds greatly to appearance of the plant's production area; witness the gleaming stainless steel equipment in a modern tomato products plant or a mammoth size continuous pressure sterilizer and cooler in a modern cannery. This is good for morale and produces good public relations. Visitors are favorably impressed. It often reduces confusion and excessive manual handling in food processing operations.

Should advanced food engineering be only a problem for the engineer and the technologist? No. Top management, the plant superintendent and often some of the plant's skilled mechanics will all be concerned and consulted. Often top management needs considerable convincing. If the superintendent is invited to cooperate and becomes an advocate of the advanced equipment, the three departments working together will have a better prospect of gaining top management's approval and allocation of funds. Often the technologist or a department foreman or the superintendent has an idea or a hunch for improving a process, a machine or a product, but needs the engineer to design the necessary equipment. The new idea does not always originate with the engineer. But cooperation all along the line is necessary; then it is the project of all and some key man is not trying to sabotage it.

Should the engineer or the technologist or management have the final say as to whether a new and advanced engineering change be adopted? Being a food technologist and not an engineer or manager this speaker favors delegating final decision to the food technologist, chiefly because he is responsible for quality. He must try by small scale experiments to forecast what the new device will do to the quality of his fruit juice, or canned peas, frozen berries or what ever. Likewise since he is responsible for quality control he is concerned as to how the change will affect this phase of his responsibilities. Of course, he must confer with the engineer in arriving at his decisions and make his decisions on an impersonal basis; not merely on whether he thinks the engineer is or is not a good Joe.

Will advanced engineering developments in the food industries make changes in food technologist training desirable? Yes, for the following reasons:

In order that he may fully understand the operation, limitations, capacities, and care of modern equipment, the young food technologist must know more about mechanical and electrical engineering than we old timers were expected to know. This is in addition to thorough training in chemistry, bacteriology, food spoilage, sanitation, waste disposal, food processing operations, and other standard courses useful in food technology. Otherwise he will be handicapped in respect to usefulness and advancement.

The new advanced equipment may so greatly increase the capacity of a processing line that special, rapid methods of checking quality of the product become necessary. The food technologist and his laboratory staff may have to devise these rapid methods or they may receive assistance in such development from State or Federal or commercial laboratories. For example, a new orange juicing machine may have such great capacity that samples must be taken and examined at 15 minute intervals for vitamin C content, total acidity and color, as affected by variation in the raw material. Obviously, quick methods of analysis would be needed.

So, I return to a statement made at the beginning of this talk. The technologist, the superintendent and the engineer must cooperate in planning important advances in engineering to minimize the danger of costly mistakes. In fact the process should be tested by the technologist insofar as practicable before the engineer undertakes his detailed drawings. Also as he proceeds

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, California, July 11-15, 1949.

with his drawings and specifications he should consult with the food technologist who will often be able to suggest changes that will make the machinery more effective or will catch errors that might cause trouble later. In other words team work is essential.

Then after the new machinery is built, set up and put into operation, all hands, including the engineer and the technologist, will cooperate in making the "darned thing" operate efficiently, effectively and economically so that the plant will operate profitably.

An excellent example of effective cooperation by engineers, food technologists and management is the development of the ion exchange technique to purify juice from pineapple waste for the production of a light colored, stable syrup of pleasing flavor for use in canning of pineapple; as described by R. W. Porter in Food Industries, Volume 20, Number 5, pages 85-96, May 1948. Thorough laboratory research and pilot scale production preceded design, construction and installation of the commercial plant. Consequently, when the process was put into production, it worked smoothly and efficiently. W. V. CRUESS.

Appreciation

For three years FOOD TECHNOLOGY has existed as an official publication of the Institute of Food Technologists. Whatever enjoyment or worthwhile information this journal has brought to its readers has been with the sufferance of eighteen men who have given unselfishly of their time and talents to the task of seeing that what is published in FOOD TECHNOLOGY is worthy of the consideration of its readers and is in proper form for presentation to them.

These men are the Associate Editors of FOOD TECHNOLOGY.

Since the preparation began for the first issue—that of January, 1947—these men have always responded promptly to requests for assistance, thus making it possible for the journal to be issued regularly, and generally on schedule.

Up to the present time, no one has retired from our Editorial Board; since the first meeting of the Board in 1947, however, the Associate Editors have favored a limited tenure of office for themselves; in 1948, a policy was adopted making the term of office three years, and the policy has now become effective. Accordingly, six Associate Editors, whose names were drawn by lot, as told in the minutes of the 1949 meeting of the Editorial Board, published in the November issue, will retire from the Board on December 31 and six new members will appear on the Board immediately thereafter. Those who will no longer be with us are W. H. Cathcart, H. C. Diehl, L. S. McClung, E. M. Mrak, B. E. Proctor, and P. C. Wilbur.

Those whom we welcome to take their places are E. C. Crocker of Arthur D. Little, Inc.; J. Avery Dunn, of Atlantic Gelatin; M. S. Dunn, of University of California, Los Angeles; D. F. Sampson, of American Can Company; George F. Stewart, of Iowa State College, and C. R. Stumbo of Food Machinery and Chemical Corporation. Dr. J. A. Dunn will take over the assignment of Book Review Editor which has been carried so capably by Dr. Cathcart, and Mr. von Loesecke will be News Editor, taking over this important and somewhat trying assignment from Dr. Proctor who has brought that department to its present position of being one of the most popular in our journal.

In addition to these changes, it is with regret that we announce that a member of the Board is relinquishing his post at the earnest suggestion of his physician. Mr. W. Ray Junk has found it advisable to favor his health by reducing, for the time being, the volume of his responsibilities, which, as all who attended the San Francisco Convention realize, was greater during the past year than any man should carry. As General Co-chairman of the Ninth Annual I. F. T. Convention, Mr. Junk carried much of the burden of putting together one of the finest meetings I. F. T. members ever attended. We have confidence that Mr. Junk, showing in this instance his usual sound judgment in following good advice, will soon become again his normal energetic self.

To take Mr. Junk's place on the Editorial Board, FOOD TECHNOLOGY is pleased to have secured Mr. Prescott R. Lloyd of C. and H. Sugar Refining Corp. Ltd.

We know that we express the sentiment of the entire Institute when we say to these retiring Associate Editors and to the organizations with which they are affiliated, "We thank you." They have not only given a service involving time and talent which has advanced the welfare of I. F. T. but they have also contributed money to meet a substantial cost of postage for correspondence and for returning manuscripts to the editor's office. The membership of the Institute perhaps has been unaware that the entire cost to the Institute of editing FOOD TECHNOLOGY consists of the salary of a secretary in the editor's office and the operating expenses of the editor's office, i. e., postage, supplies, telephone and telegraph communications, etc. Probably, in most instances, the employers of the Associate Editors have generously underwritten the expense of postage, secretarial assistance, etc., involved in the work of the members of our Editorial Board. In some instances, however, the individuals have carried this expense themselves. These facts are mentioned because we believe the members of I. F. T. will be glad to know of the unsung contributions which have been made by these fellow members and their employers for the benefit of all of us.

As we express our thanks to those from whom the Institute has already received its dividend, let it not be overlooked that our commendation of them is matched by our appreciation of the willingness of the new Associate Editors to carry on the work which was started by their predecessors. C. OLIN BALL.

Government Meat Inspection in Canada[a]

G. A. ROSE

Associate Chief Veterinarian, Department of Agriculture, Ottawa, Canada

(REVIEW PAPER)

The historical background of food inspection and the objectives and application of meat inspection in Canada are discussed.

Man's habit of looking over the food he eats is not a modern one—it dates back to time immemorial. One of the earliest records of this is to be found in Holy Writ where we read that Moses, the Prophet, ordained the examination of the flesh of animals as an important religious rite. He forbade the eating of meat that had not come from cloven-hoofed ruminants, and even extended this proscription against the consumption of blood and the sinew of the thigh. Likewise, predacious birds, fish without scales, and badly injured animals were considered by him to be an abomination.

The ancient Egyptians, Greeks, Phoenicians, and later, the Mohammedans, also passed laws controlling the consumption and distribution of meat. Although, in many instances, superstition and religious principles undoubtedly governed their actions, there is evidence to support the view that the food edicts of that period were also inspired, partially at least, on hygienic grounds.

Later, during Mediaeval times, attempts were made by the municipalities of some European states, to prevent the sale of obviously diseased or so-called "mangey" meat. A charming little story is told in the Chronicles about one village where all the pigs had to be assembled at the local monastery at an appointed time, to be inspected simply by viewing their tongues! In all probability the monks at this monastery had been reading one of Aristophanes' plays, in which a slave exclaims "Let us force a stake into his mouth as do the cooks, and then, by pulling out his tongue, we will examine, boldly and at our ease, his wide-opened mouth to see if he is measled!'

Following the Renaissance, man became more objective in his thinking: to be guided by instinct and mysticism alone was not enough. Trade flourished, and, with the interchange of goods between countries, followed the interchange of skills, ideas and knowledge. It was an age of vitality when the spirit of adventure led men to create wonderful works of art, to seek distant lands and to search for truth. Thus we find in the ensuing years that life was gradually becoming more and more the beautiful and expansive thing it should be, marred only by Wars and Pestilence. It was the latter which challenged and engaged the curiosity of some of the foremost thinkers of the time, resulting in an investigation and systematic study of the body and its structure and functions. Before long the researches in this field led to the publishing of whole treatises not only on the anatomy and physiology of the body itself but also on the "altered" or disease signs encountered in it.

By the middle of the nineteenth century some startling information had been brought to light about human disease, not the least important being the fact that certain diseases could be transmitted through animals by the consumption of infected meat. This was particularly true of certain parasitic diseases as evidenced by two outbreaks of trichinosis in Germany affecting some 500 people in the years 1863 and 1865, when it was demonstrated that the 149 deaths resulting from these outbreaks were due to the eating of pork infected with trichinae. Even ten years previous to this Kuchenmeister had demonstrated that the larval or cystic form of the human tapeworm Taenia solium was to be found in the muscles of pigs.

Experiences such as these, followed by the world-shaking discoveries of Koch and Pasteur, led people to become increasingly particular about the things they ate. It is not surprising to note, therefore, that by the turn of the twentieth century, the people of certain European countries were becoming more and more concerned over the possibility that the milk and meat they imported from distant lands might be tuberculous or give rise to sickness through other infective agents. Before long they were demanding that the food they purchased be inspected in the country of origin and certified as wholesome.

Canada's position as a food producer must have been a difficult one at this juncture, since she was no doubt largely dependent upon her exports to bring her the machinery and manufactured artticles she so badly needed. Not least to be considered was the fact that the marketing of dressed livestock overseas was a handy means of disposing of her large grain surpluses.

To meet this emergency, legislation known as the Meat and Canned Foods Act was introduced by the Canadian Parliament in 1907 to provide for a uniform system of inspection and control over all packing plants and abattoirs engaging in interprovincial or export trade. Subsequent amendments to this statute have made it possible to enlarge the scope of our system of meat inspection.

The primary purpose of the present system of Government meat inspection in Canada is:

(1) to detect and destroy diseased and otherwise unfit meat
(2) to prevent the use of harmful preservatives or other deleterious substances in the preparation of meat food products
(3) to ensure that meat products are kept clean during the various stages of preparation
(4) to mark sound and wholesome meat "Canada Approved"
(5) to provide ready recognition, and to prevent the use of false or deceptive labels and statements on meat foods that are offered for sale.

Before Government Inspection is granted to a plant certain standards must be met; the plant is required to be acceptably constructed, equipped, and otherwise arranged so as to provide the means for the maintenance of proper sanitation and to furnish facilities necessary for carrying on the inspection. A few of these requirements include:

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, Calif., July 11, 1949.

(1) the building to be constructed of steel and concrete, brick and tile, rather than material of an absorbent nature, such as wood
(2) predominance of impervious floors (tile or concrete), inside walls to be of smooth cement finish, or preferably glazed tile
(3) adequate slaughtering facilities
(4) ample and clean operational space
(5) proper lighting and ventilation
(6) an abundant supply of potable hot and cold water under adequate pressure
(7) rust-resisting metal equipment, preferably stainless steel, for handling meats
(8) modern plumbing and proper sewage disposal: floor drains should be at least 4" in diameter, equipped with deep seal traps and vented: discharge lines for paunch contents must be 8", or more, in diameter
(9) pavement, with drainage connection from livestock pens, and outside premises kept free from objectionable conditions
(10) Welfare rooms well located and properly separated: toilet and dressing-room facilities are required for employees of each sex
(11) suitably located and properly equipped Inspector's offices.

It is essential that the plant lay-out be suited to the type of operations to be conducted, since experience has shown that improper planning invariably leads to general disorder and consequent delays in the handling of products—all of which tend to increase contamination hazards.

Since meat decomposes fairly rapidly at room temperatures, artificial refrigeration of a type and capacity adequate to plant needs is regarded as essential equipment. It is desirable, for instance, that rooms in which certain meats are prepared and processed operate under refrigeration or that refrigerated storage rooms be close to where meats are manufactured and handled. It is no less desirable to have departments where inedible products are dealt with completely separated, and as far removed from the scene of food handling as possible.

Plants that meet Dominion Government sanitary requirements, provided the volume of plant output is sufficient to warrant the full-time services of one or more Dominion Government Inspectors, are granted inspection, on condition that they are able, and prepared, to comply with the regulations made under the Meat and Canned Foods Act. Managements must, for example, agree to the full-time supervision of every operation conducted within their establishments, and cooperate to the fullest extent in maintaining a satisfactory system of control over all incoming products, as well as those that are being sent out. On no account may these establishments give outlet or entry to meat food products that have not been inspected and approved by Government Veterinarians.

Following the granting of inspection and prior to the commencement of operations under inspection, an establishment is staffed with the requisite number of government appointed officers who are responsible to the Veterinary Director General of the Department of Agriculture of Canada, under whose direction Meat Inspection Regulations are administered.

At establishments where slaughtering is conducted, the antemortem and postmortem inspection of animals is carried out by fully qualified government veterinarians. The veterinarians stationed in the livestock yards are required to see that all injured, diseased or suspected of being diseased animals are segregated and dealt with as the Inspector in Charge may direct. This antemortem inspection is of great value in more than one respect, viz.:

(1) It affords a large measure of protection to packing house employees since certain animal diseases, such as Anthrax, are readily transmissible and, sometimes, fatal to man
(2) It prevents the use of dead or dying animals for food purposes
(3) It can be of considerable assistance in tracing and preventing the spread of animal plagues.

Animals that have passed antemortem inspection are, after entry into the plant, quickly slaughtered and dressed under the supervision of Veterinarians who specialize in postmortem inspections. All parts and organs of every carcass are submitted to rigid postmortem inspection, and those found to be diseased or unwholesome are carefully identified. All meat found to be unfit for human consumption is consigned to the inedible section of the plant where it is rendered, sterilized and denatured in government sealed tanks.

There are several factors which influence an Inspector's judgment during the course of his postmortem examination, viz., the type or character of the disease encountered, its location and the extent to which it occurs. Variations in the distribution of a disease may also play an important part in deciding whether an entire carcass, or only a small portion of it should be condemned. It can be seen, therefore, that competent inspection serves not only to protect the public health but also avoids the destruction or waste of meat that is in reality fit for human consumption.

In the past year, nearly seventy different disease conditions were encountered in the various classes of livestock slaughtered under inspection: the main causes of carcass condemnation were:

(a) Tuberculosis
(b) Pneumonia
(c) Arthritis
(d) Mucoid Degeneration
(e) Septicaemia

Meat carcases that have passed inspection are washed, and quickly removed to rooms under refrigeration. One of the most important features of Government Inspection is to see that meat which has been passed for food purposes, is hygienically handled and kept free from contamination. Thus great emphasis is placed upon the personal cleanliness and health of all employees of establishments; care being taken to see that those suffering from chest, throat and skin ailments are not permitted to handle edible products. The condition of employees' hands is of particular importance.

Another item of importance in connection with the handling of meat is to see that a safe but effective programme of pest control is regularly carried out in each inspected establishment. In this regard the prompt removal of rubbish from the plant premises, the screening of all windows and ceiling vents is strongly emphasized.

Perhaps the greatest progress made in recent years

has been the establishment of standards for foods. Today, sampling for laboratory examination is carried out in inspected establishments to ensure that the moisture, cereal and preservative content of each meat food product is kept within the prescribed limits, as well as to prevent dyes and substances injurious to health from being used. As a further protection to the consumer, no statement or mark that is calculated to deceive may be shown upon any product: hence all labels must be submitted for government approval before use. These, and all other inspection requirements, are also applicable to imported products.

Meat food products that have passed inspection are marked with the Inspection Legend which is a government mark, circular in shape, and on which appear the words "Canada Approved," and the official number assigned to the establishment. In the center is shown the authorized pattern of the Crown.

The far-reaching effects of this compulsory system of meat inspection cannot be over-estimated, for the record shows that Canada has not only retained her old European markets, but has succeeded in establishing new ones in many parts of the globe.

Each year, upwards of eight million cattle, sheep, swine and poultry are handled in inspected establishments throughout Canada, by a staff of approximately 450 officers. Despite the fact that Canada has a large rural population, it is estimated that nearly 70% of the meat consumed is inspected and marked "CANADA APPROVED." This, coupled with the fact that Canada's meat export potential can be reckoned at almost a billion pounds, would indicate that a National system of inspection is not an unwise investment on the part of the Federal Government. To the majority of housewives it is a guarantee that the meat they buy is safe to eat; to the farmer, it is an assurance that more ready markets are available at home and abroad for the food animals he raises.

Continuous Manufacture of Jellied Substances at Low Temperatures[a]

GUSTAVE T. REICH[b]

Pennsylvania Sugar Company, Philadelphia, Pennsylvania

The food industry is gradually replacing batch processes with continuous operations. Not all batch processes are readily converted to continuous operation and usually the combined experience of the food technologist and the engineer is necessary in order to obtain a well-balanced operation.

The author describes the conversion of the normal batch process for jelly and jam manufacture to successful continuous operation. He considers the advantages of the continuous process to be closer control of time and temperature, which results in less color and flavor destruction and therefore better quality products.

The trend in the food industries is towards an automatic continuous operation. Whether this can be carried out with every process is problematical. In some instances the batch operation is preferable either from capital investment standpoint or simplicity. Other processes should be semi-continuous, while in most instances the continuous process is desirable and practical.

Unfortunately, many manufacturers are led to believe that to convert a batch process into a continuous process requires only the application of good engineering. Far from it. Sometimes a good food technologist has more success than an engineer, as so many factors enter into the design of a continuous process that in order to get a well balanced process we need the combined knowledge of the food technologist and engineer.

In the following, factors influencing the quality of the products will be discussed briefly.

[a] Presented before the Eighth Annual Convention, Philadelphia, Pa., June 8, 1948.

[b] Consulting Chemical Engineer.

Factors Influencing Quality

For the manufacture of jam, jellies, marmalade and preserves, fruit or fruit juice, sugar, pectin and acid are required in a well balanced ratio.

When producing preserves, the cooking procedure, type of structure in the fruit, temperature and kind of sugar, i.e., whether it is pure sucrose, dextrose or a combination of both, have an influence upon the character and degree of the fruit texture.

Every manufacturer strives to retain in his product the fresh fruit flavor and color. Therefore, the aim is to reduce the time of cooking to the minimum at the lowest temperature possible. For this reason, vacuum evaporation is preferred, especially for the manufacture of preserves.

Figure 1 shows the time cycle for the production of strawberry preserves when it is produced according to the batch process under reduced pressure. It requires approximately 30 minutes for charging, concentrating and discharging the evaporator. In this instance the syrup is not separated from the fruit and not concentrated separately.

Principle of the Continuous Process

It has been thought in the past that to control accurately the time and temperature and quality of a preserve or jelly product effectively, it was necessary to conduct the operations on a batch basis, which also limits the amount of material subject to spoilage in a given operation.

Such a conception is erroneous in that by suitable manipulation and by the use of suitable apparatus more uniform results may be obtained by continuous opera-

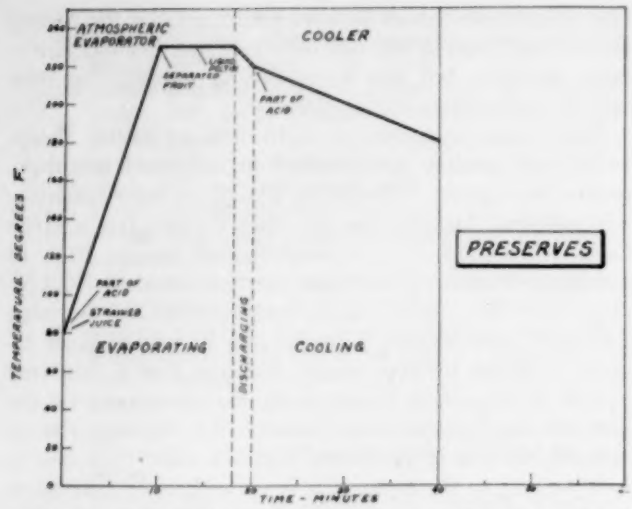

FIG. 1. Time Cycle for the Production of Preserves. Batch Process—Atmospheric Evaporation.

tions. In a properly designged apparatus provision has to be made to insure that substantially every portion of the material is subjected to the optimum time and temperature of treatment. The assumption of uniformity of treatment based on average time and temperature of treatment of a given bulk of material is fallacious. A food product in which one portion has been overtreated and another portion proportionately undertreated and mixed is not equivalent to a product in which each portion has been subjected to the optimum treatment.

In the batch process, all process steps are carried out in jacketed kettles at atmospheric pressure or when vacuum pans are used, a complete charge is moved from the kettle to the pan and then transferred again to another kettle.

In a continuous process it is aimed to carry out preheating, mixing with liquid or granulated sugar and other ingredients and passing forward continuously into a vacuum evaporator, removing continuously the highly concentrated product and then raising the temperature at an even rate for inversion and filling purposes. The apparatus in which all steps are carried out must be very flexible, permitting quick changes from one type of product to another as from jams to jellies or preserves. It must be capable of ready and accurate control of temperature, concentration of liquors, rate of inversion and other factors which must be accurately controlled.

Furthermore, during inversion the albuminoids coagulate and they must be removed as a scum in order to give a clear product. This continuous apparatus should permit the fruit, either whole or crushed, to be mixed uniformly with the jelly base, for example, fruit juice, sugar, pectin and acid, so that no separation or stratification occur in the product.

In the batch process very little power is used, therefore, the power requirements for a continuous process should be relatively low, likewise steam consumption. A continuous apparatus should be capable of producing a large output with a minimum of labor and should conserve floor space and be easily cleaned and maintained in a sanitary condition.

Finally, it should yield a finished product of uniform and controlled quality.

A few years ago the author described a continuous process for the production of 200,000 pounds of cranberry sauce per day at atmospheric pressure *(2, 3)*.

In the following a process and apparatus for the continuous production of jelly, jam, marmalade and preserves will be discussed and thus open a new vista, departing from the traditional batch process *(4)*.

Continuous Vacuum Process

A perusal of the batch process shows that the time factor for each step varies. Charging and preheating, transferring to vacuum pan, cooking, discharging, each step is timed differently. In the continuous process an even, uniform flow of material does take place and it is characteristic of the process that at no stage does the temperature of the liquid exceed the atmospheric boiling point. Operation under such conditions preserves the activity of pectin, consistency of the fruit and conserves essential oils. Figure 2 shows the time cycle for

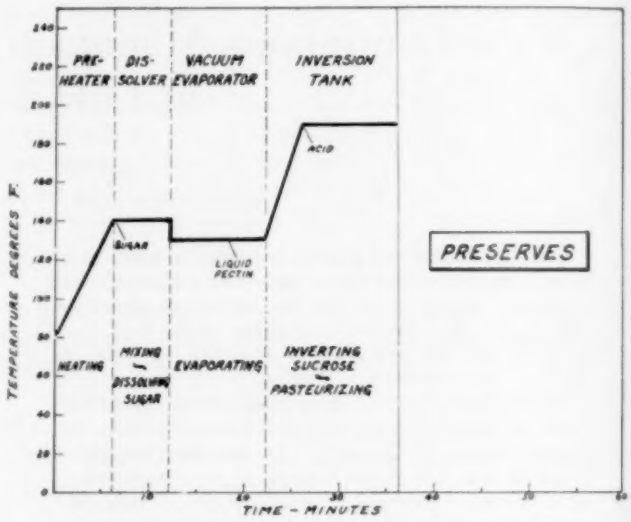

FIG. 2. Time Cycle for Processing Continuously.

the production of preserves according to the continuous process.

The principle of the continuous process is preheating; dissolving sugar or mixing with other materials; evaporating and inverting sugar in separate zones under optimum conditions appropriate to each step.

In order to accomplish the above results the apparatus as shown in Figure 3 consists of four units—preheater, mixer, evaporator and inversion tank. The latter also serves simultaneously as a pasteurizer.

Preheater and Dissolver

This unit serves for receiving the fruit juice, crushed fruit or thawed out frozen fruit, and the temperature raised to between 120° and 140° F. (48.5°-59.5° C.), suitable for subsequent processing. From the preheater the material passes into the dissolver, where granulated or liquid sugar or other materials are added and the temperature maintained in this unit also at 120° to 140° F.

The preheater and dissolver are elongated horizontal

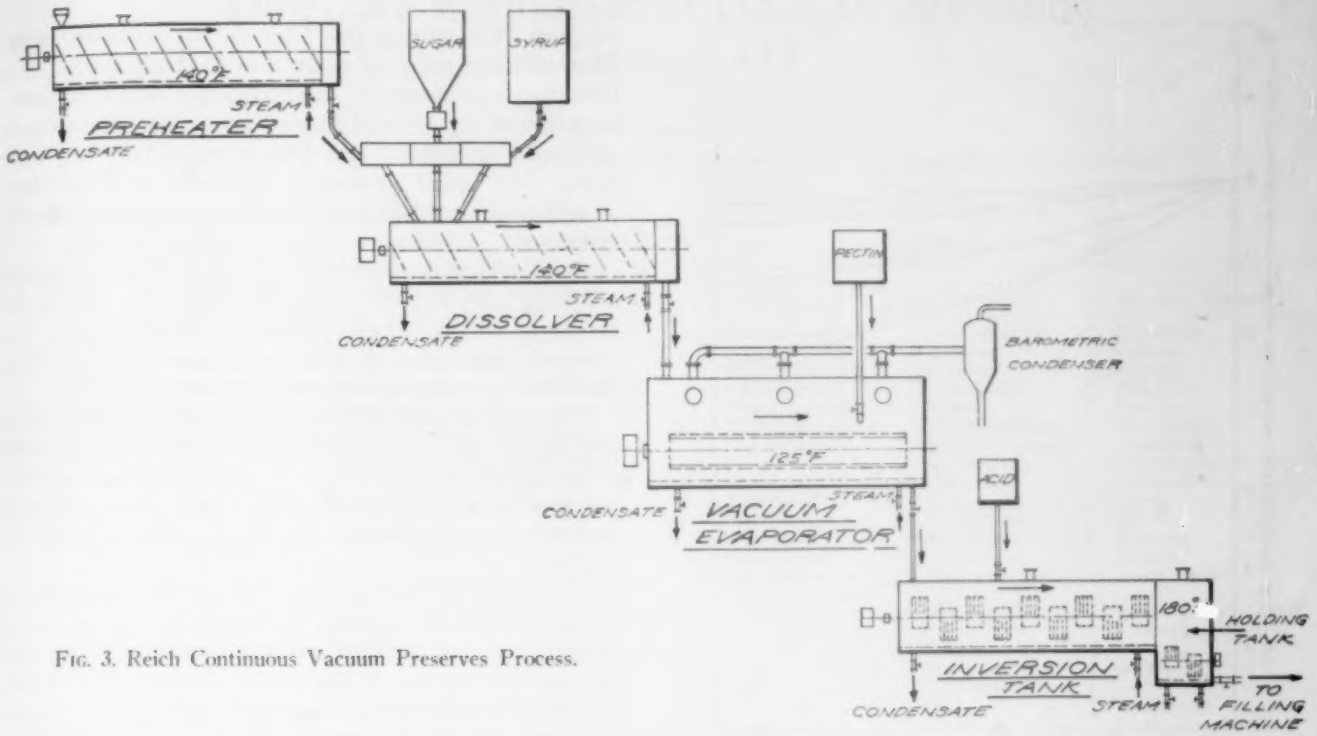

FIG. 3. Reich Continuous Vacuum Preserves Process.

jacketed tanks, each provided with a specially built agitator which serves also as a heating unit. The dissolver differs from the preheater primarily in the construction of the agitator as each unit handles different materials and serves different purposes. They are provided with a removable cover which gives access to the tanks for cleaning and servicing purposes. Provision has also been made for the use of an inert gas so as to exclude the air and prevent the oxidation which would destroy the fruit flavor and impart an off taste to the finished product.

A very important feature of the design of these two units is, that they permit a 50 percent reduction in the production and still the product flow is uniform, i.e., if the time factor through each unit should be 10 minutes, it will be the same whether the production is 100 or 50 percent and whether we handle liquids only or stratified products such as thawed out strawberries or cherries.

The preheater and dissolver are provided with relatively large heating area, thus permitting rapid heating with steam of 20 p. s. i.

The granulated sugar, or liquid sugar is added to the preheated product at a predetermined rate and quantity, so that the final product will have the ratio of fruit and sugar as required by the Government. The design of the agitator is such that the granulated sugar is dissolved very rapidly and caramelization is avoided.

Vacuum Evaporator

The vacuum evaporator is an elongated enclosed tank, provided with a semi-cylindrical bottom and heating jacket. The evaporator is provided with a heated agitator having a hollow shaft section, to which hollow agitator blades are mounted on tubular radially extending arms. The steam flows from the shaft section into the blades through the radial tubes and the condensate from the blades is carried out through the tubes. The blades are longitudinally corrugated to provide increased heating surface and the warped external surface will catch floating pieces of fruit and carry it down into the body of liquid in the tank.

If the evaporator is to be used only for the production of a specific product then we may provide agitator blades as will be described under inversion tank.

In this unit also the ratio of heating surface to tank volume is relatively high which makes it possible to evaporate large amounts of water in a short time without employing deleteriously high temperatures in the heating jacket and agitator.

The vapors from the evaporator are removed through two or more vapor lines and then pass according to the standard practice through a catchall and finally to a barometric condenser or jet ejector.

Owing to the continuous flow the density of the liquid changes continuously, i.e., it increases towards the discharge end. Therefore, very careful control must be maintained and for this purpose the evaporator is provided with several proof sticks which permit the checking of the liquid density at any point of the evaporator.

When the standard vacuum pan is used, the procedure is to concentrate the fruit to a predetermined density and add liquid pectin to it and finish the charge. In the continuous process, liquid pectin can be continuously introduced into the pan at several points. That the vacuum evaporation has less destructive action upon the pectin can be seen in Figure 4, which according to Baker *(1)* at 130°-150° F. (54.5°-65° C.) at pH 4-5, is negligible, but the slope increases as the pH is lowered, about twice at pH 2.5.

The evaporator is provided with several manholes and gas tight covers on both sides, giving access to the interior of the evaporator for cleaning purposes. The level of liquid in the evaporator may be observed and controlled through suitable sight glasses.

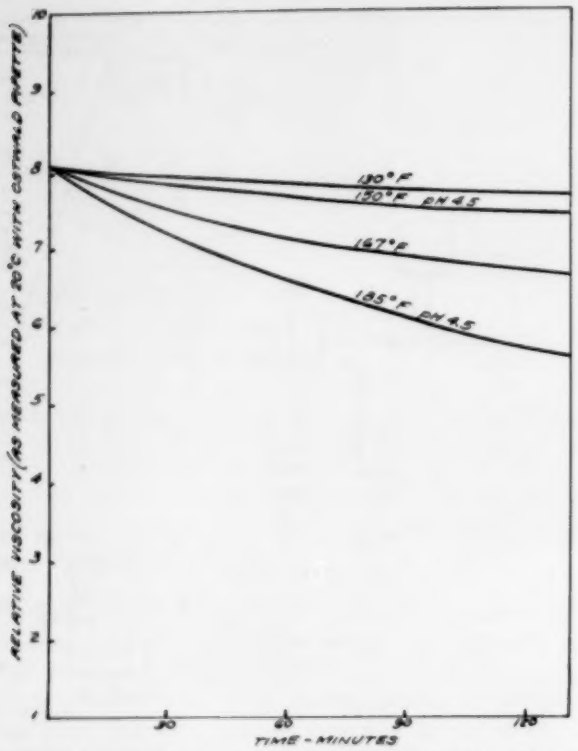

FIG. 4. Degradation of Pectin in Solution (0.5%) with Time of Heating.

If atmospheric evaporation is desired the barometric condenser is by-passed. Likewise, should we desire to recover part of the vapors, a surface condenser can be placed between the evaporator and barometric condenser, which is sometimes used on batch evaporator.

Inversion Tank

The inversion tank consists of two tanks as an integral unit. The inversion tank is an elongated horizontal tank divided into three or more communicating sections by longitudinally extending vertical baffles. These baffles are provided with openings, permitting a continuous flow in a zig-zag direction. The inversion tank has a jacket permitting a rapid heating of the product coming from the evaporator from 125° up to 180° F. (50.5°-82° C.) The raising of the temperature results in the inversion of part of the sucrose, pasteurization and a free flowing product for filling purposes.

The inversion tank is also provided with two types of agitators which can be interchanged readily. When jelly is to be produced the agitation should be such that the albuminoids can separate easily and be collected on the top of the product. If the agitation is too violent, albuminoids will not separate as easily removable scum, but will remain in the jelly and result in an unmarketable product. Therefore, the agitator blades merely move the scum forward *(4)*.

Should we process preserves it is essential to keep the fruit submerged in the liquid and prevent stratification. Therefore, the agitator shaft is provided with curved blades. The inner edge of the blade is affixed to the shaft and is partly solid to give rigidity. The blade is slotted at spaced intervals to provide relatively long thin radially extending fingers and they are slightly curved in the direction of rotation of the agitator for the purpose of engaging the fruit in the mixture being processed and carrying down into the fruit syrup. The fruit has a tendency to float and this particular construction of the agitator blades insures that the fruit is repeatedly immersed and held immersed in the fruit syrup. As stated previously the same fingered construction of the blades can also be used in the vacuum evaporator.

At the discharge end of the inversion tank is located a holding tank for receiving and temporarily storing the processed food products. From the holding tank, the finished jam, jelly or preserves flows to the filling machine for charging into suitable containers.

The holding tank is integral with the inversion tank and when jams or preserves are produced, an agitator provided with slotted blades is used to prevent stratification. The holding tank is also provided with a heating jacket so as to maintain the proper temperature for filling.

An apparatus has been erected, which is capable of producing 120,000 pounds of preserves per day in 8 hours, requiring one operator and one assistant (mainly for checking the correct densities). Owing to the closely controlled conditions on each unit, the human element is as much as possible eliminated and that each necessary function is effected without disturbing or unduly influencing the other functions is one of the cardinal points in the continuous process.

Summary

1) Problems to be considered for the production of a quality product and their influence upon the design of a continuous process.

2) A brief description of a batch process operated at atmospheric or reduced pressure is given.

3) The principle of the Reich process for the manufacture of jam, jellies, marmalades and preserves applying vacuum evaporation is described.

4) Large production with a few operators can be achieved by operating continuously.

5) An apparatus required for the production of jam, jellies, marmalade and preserves consists of a preheater, dissolver, vacuum evaporator and inversion tank.

6) The temperature maintained in the continuous process up to the inversion tank never exceeds 140° F. (58.5° C.).

7) The maximum steam pressure on the preheater and dissolver is 20 p. s. i.

8) The continuous apparatus has great flexibility, permitting the production of jelly or preserves.

9) Unit capable of producing 120,000 lbs. of preserves daily is in actual operation.

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Objective Evaluation of Odor Deterioration in Orange Oil[a]

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The development of so-called "terpeney" odors in citrus oils, brought about by air oxidation, has long been a problem in the food industry. In an attempt to place the evaluation of odor deterioration in citrus oils on a reproducible, objective basis, orange oil (as representative of citrus oils) was studied by several techniques. A standard Warburg manometric system was used to measure the quantity of oxygen absorbed by the oil under controlled conditions. Changes in the infrared absorption spectra of the samples were studied, to follow the chemical changes during oxidation and to suggest possible reaction products. Calibrated odor panels employing the method of paired comparison gave data on the quantity of oxygen necessary to produce "terpeney" odors. It is believed that such a combination of physical and organoleptic techniques may afford a new approach to the important field of odor evaluation, not only for essential oils but for many foods and food components.

Introduction

Orange oil and citrus oils in general are prepared in large quantities by expression or distillation from the oil cells of the fruit rind and are used extensively for flavoring purposes in the manufacture of baked goods, confectionery, beverages, and similar food products. After expression and prior to use, these oils are particularly subject to an odor deterioration. This deterioration results in "off" odors, which are described in the essential oil trade as "terpeney" and are attributed to autoxidation by atmospheric oxygen.

Unfortunately these oils are not simple chemical materials but are, rather, mixtures of several compounds (see Table 1), some of which may be present in only small amounts but have considerable effect on the odor of the mixture. Heretofore, experimenters have studied citrus oil deterioration from the chemical standpoint, and much work has been done in studying the constituents of the oils. The data thus obtained have been admirably summarized in such standard texts as those by Gildemeister and Hoffman *(1)*, Parry *(2)*, and recently by Guenther *(3)*.

The investigation described in this paper was an attempt to approach the problem from a slightly different point of view, with the use of two major techniques:

(1) The use of calibrated odor panels, whose results are analyzed statistically.

(2) The use of the newer physical methods of analysis, such as oxygen absorption techniques and infrared absorption spectroscopy.

It was felt that these techniques, properly employed, might throw new light on citrus oil deterioration, supplementing the information now available by showing that air oxidation is primarily responsible for "terpeney" odors and can be reproduced in the laboratory under accelerated and controlled conditions. In addition, it was hoped that the compounds responsible for the "off" odors could be tentatively identified.

The observations were made on orange oil, as representative of citrus oils in general.

TABLE 1

Constituents of Citrus Oils[a]

Orange Oil (California)	Lemon Oil (California)	Lime Oil (Mexican Distilled)
d-limonene 80-90%	d-limonene 80%	d-limonene
n-capric aldehyde	α-pinene	α-pinene
l-linalool (trace)	β-pinene	β-pinene
d & l-terpineol	γ-terpinene	Bisabolene
n-nonyl alcohol	Citral	Furfural
Methyl anthranilate	Octylic aldehyde	Octyl alcohol
Caprylic esters	Nonylic aldehyde	Nonyl alcohol
Citral	Geraniol	n-capric aldehyde
Citronellal	Acetic acid	Lauric aldehyde
Formic acid	Capric acid	Citral
Acetic acid	Caprylic acid	Borneol
Capric acid	Cadinene	Terpineol
Octyl alcohol	Linalool	Linalool
An olefinic alcohol	A tertiary alcohol	Lauric alcohol
White amorphous compound	An aldehyde	Esters of acetic, octylic, decylic, acids
	An amorphous compound (Citrapene)	An azulene
		An aldehyde
		A phenol or phenol ester

[a] The data in this table are compiled from sources in references 1, 2, 4, and 5.

Odor Panel Tests

The difficulties of making complicated odor tests requiring considerable time and attention on the part of the observer are obvious. Hence it was decided to design these tests to be as simple as possible and still furnish the desired information.

The method of paired comparisons *(6)* was adopted. In this type of test the observer was given two samples at a time, one of which was always a fresh control sample and one of which might be either a similar fresh sample or an oxidized or treated sample. The respondent was asked to judge, from smelling the samples, whether he could detect a difference in the two odors. This procedure was repeated twenty times for each observer, at intervals of thirty minutes or more between the presentations of paired samples. This time interval, plus the fact that only two samples were smelled at a time, was considered sufficient to minimize any effects of fatigue or olfactory adaptation that might be present.

Ordinarily from three to five responses were made by an observer on any one day, which means that the twenty judgments were spaced over a period of several days. This raises the objection that the observer may vary in sensitivity from day to day. It was decided to retain this variable in the experiments, however, for

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, California, July 13, 1949.

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under these conditions detection of odor difference would be of more significance.

The order in which the two members of a pair were presented to the observer was determined by the tossing of a coin and was the same for all observers.

The samples were presented in approximately 5-ml. portions, contained in 25-ml. weighing bottles with ground-glass stoppers. The bottles were coated with black glyptal paint, baked dry, to conceal any color differences that might exist in the samples. The bottles were thus identical in appearance.

In general, the observers were uninformed concerning the nature of the test and the samples, in order to eliminate personal bias as much as possible.

In the calculation of the significance of the results, the observer's score is compared with the theoretical score that would be obtained by chance. The theoretical chance score can be calculated from the binomial expansion: $(\frac{1}{2} + \frac{1}{2})^n$

where n is the number of trials.

The deviation of the observer's score from the theoretical chance score when known "off" samples are used in the paired comparison test is a measure of the observer's acuity to smell. When an observer has been found to have an acute sense of smell and that observer is judging unknown samples, the deviation of his score from the chance score is indicative of an actual difference in the odors of the samples.

The significance of the deviation of the observer's score from the chance score can be readily measured by the Chi Square test *(7, 8)*. A probability level of 0.05 in the result obtained by the Chi Square test was chosen as indicating that the observer's preference deviated significantly from chance. This probability level was chosen arbitrarily, because it is the level generally accepted in biological research *(9)*, and no evidence for the need of a more rigorous criterion was available.

Selection of the Odor Panel

Members of the odor panel were selected ("calibrated") by means of a series of paired comparison tests. In these tests, two oils of known quality obtained from industry were used. One sample was an oil judged by experts of the commercial concerns to be "terpeney" and, therefore, unfit for commercial use. The second was an oil of the same type and from the same source but considered fresh and acceptable. Those individuals who could successfully detect the odor difference in the two oils with a score significantly greater than that obtainable by chance at the 0.05 level of probability were chosen as panel members. Three individuals of a group of fifteen tested showed adequate sensitivity and were used on the panel for subsequent tests.

Oxygen Absorption Technique

The rate of oxygen absorption by a sample of orange oil can be measured by a relatively simple technique that will give reproducible results. Many investigators in the field of edible fats and oils have used this technique for the study of rancidity *(10, 11, 12)*. In this present study the technique was employed to furnish a standard method of oxidizing the orange oil samples under controlled conditions, in which the amount of oxygen taken up by the sample would be known.

A standard Warburg apparatus and the constant volume technique were employed. Such equipment and technique are thoroughly described in standard texts on this subject *(13, 14)*.

The oxidations were carried out at 40° C. with a variation of ± 0.1° C. The reaction flasks were fully immersed in the constant temperature bath and were shaken at a rate of 70 strokes per minute, with a total throw of approximately two inches. Each sample weighed one gram. The amount of oxygen absorbed per gram of oil was calculated from the weight of the sample, the change in pressure of the air in the apparatus as recorded by the manometers, and the dimensions of the system.

Infrared Spectroscopy

The instrument used in this study was the Beckman Infrared Spectrophotometer, Model IR-2. Certain modifications had been made in the instrument, such as that permitting a larger cell to be used, but from the standpoint of operation these changes were unimportant. The instrument was equipped with an automatic pen-and-ink recording device made by the Brown Instrument Co.

The region of the spectrum covered was from approximately 2.2 to 15 microns. Because it has become the custom in the field to report results in terms of the working curves, especially for qualitative and comparative measurements, rather than to recalculate the data in terms of wavelength and frequency, this custom has been followed here. The approximate wavelength regions, however, have been reported, from scales available on the instrument.

Experimental

Samples of orange oil were exposed to atmospheric oxygen at elevated temperatures under the controlled conditions described above, and the amounts of oxygen absorbed over various periods of time were determined.

Figure 1 shows a series of oxygen absorption curves obtained by this method with fresh coldpress California orange oil. These are typical curves for oxygen absorption by orange oil. The point of break in the curve where the uptake greatly increases in rate is slightly different for the several reaction flasks used, because of the slightly different dimensions of the individual flasks and, hence, a difference in the surface areas of the oil exposed.

Samples of oil at definite, increasing time intervals were taken, and infrared absorption curves were made until the spectrum of the orange oil from the Warburg runs was practically identical with that of the "terpeney" orange oil used in the selection of the odor panel. This invariably occurred when the sample had absorbed from 6,000 to 8,000 cu. mm. of oxygen N. T. P. per gram of oil. When this quantity of oxygen has been absorbed, it can be considered likely that normal, fresh orange oil will become practically identical chemically

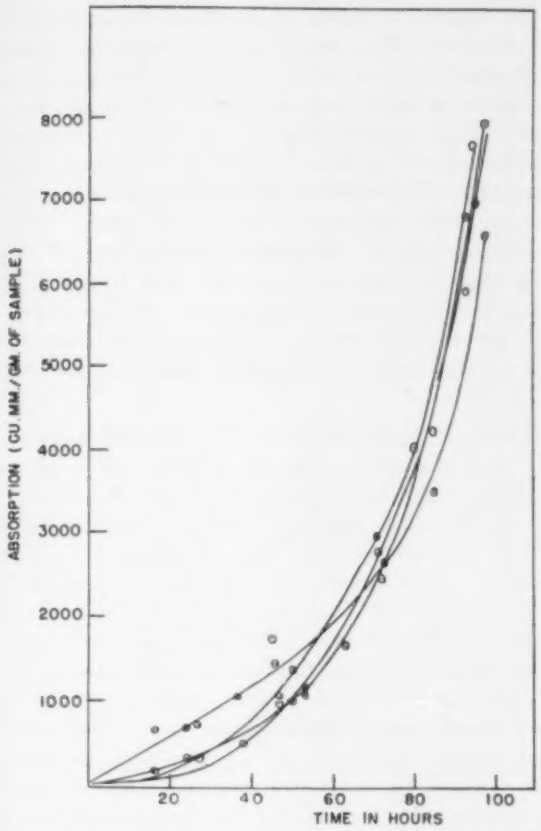

FIG. 1. Curves of oxygen absorption of fresh orange oil exposed to atmospheric oxygen at an elevated temperature (40° C.).

(as evidenced by infrared absorption spectra) with "off" oil.

To determine when a detectable difference in odor occurred in the Warburg oxidized orange oil, paired comparison odor tests were carried out. The pairs consisted of a fresh oil control and a Warburg oxidized sample that had absorbed between 7,000 and 8,000 cu. mm. of oxygen N. T. P. per gram of oil. Table 2

TABLE 2

Paired Comparison Odor Tests on Warburg Oxidized Orange Oil and Fresh Orange Oil

Observer	Number of Trials	Percent Difference Judgments	Significance
1	20	100	Very high
2	20	100	Very high
3	20	100	Very high

shows the results of these tests. Inasmuch as a level of 75% difference judgments in 20 tests is significant (probability of 0.05), the results indicate that a significant difference exists between the odor of the oxidized oil and that of the fresh sample.

Therefore, it is evident that when a sample has absorbed this amount of oxygen, its chemical composition is similar to that of "terpeney" oil, and its odor will be judged by a panel of calibrated observers to be "off" from that of the fresh sample.

As a first step in the identification of the compound or compounds responsible for the "terpeney" odor of oxidized orange oil, infrared absorption spectra were obtained on both the fresh and the "off" orange oil that had previously been used to standardize the odor panel. Figures 2, 3, and 4 show a comparison of these spectra in the regions from 2.2 to 15 microns where significant differences occurred. These regions represent, respectively, the so-called hydroxyl, carbonyl, and phenyl regions and indicate that oxidation results in the formation of these groupings in the constituents of orange oil.

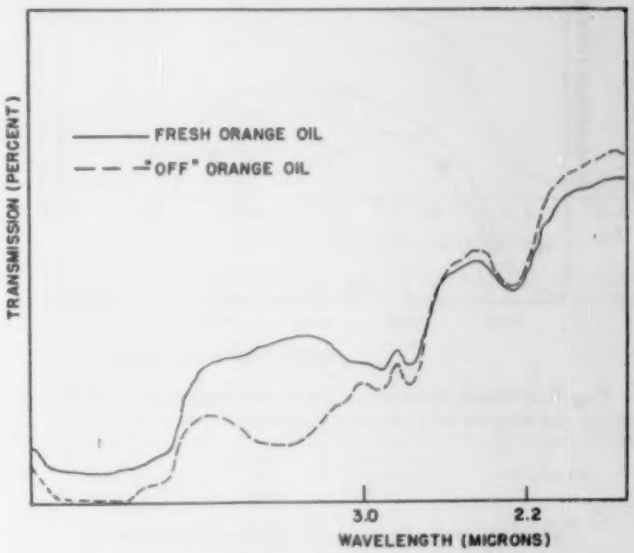

FIG. 2. Infrared absorption spectra of fresh and "off" orange oils in the vicinity of 3.0 microns.

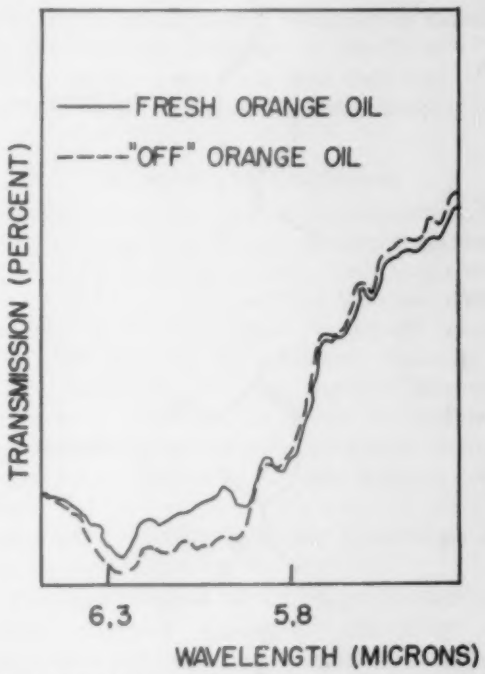

FIG. 3. Infrared absorption spectra of fresh and "off" orange oils in the vicinity of 5.8 to 6.8 microns.

For many years it has been believed by investigators in the field of citrus oils that d-limonene (see Figure 5), when subjected to autoxidation, is responsible for the deterioration in the odor and quality of these oils. The ease with which d-limonene undergoes oxidation, its presence in the oil to the extent of 80 or 90 percent,

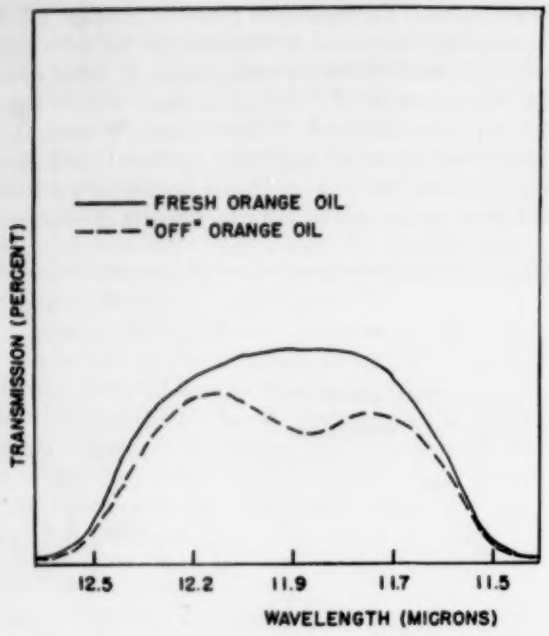

FIG. 4. Infrared absorption spectra of fresh and "off" orange oils in the vicinity of 11.5 to 12.5 microns.

Structural Formulae of d-Limonene and Its Oxidation Products

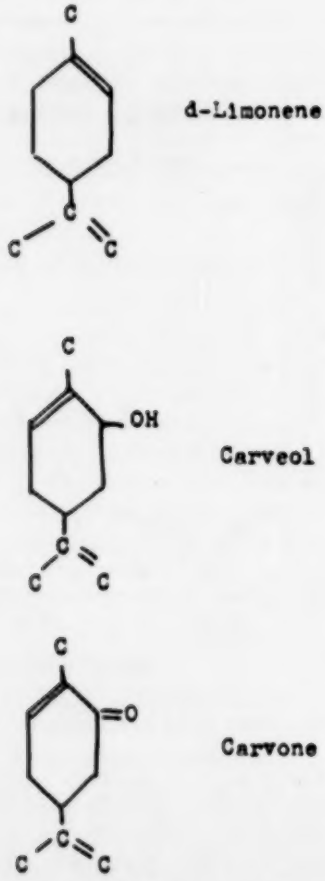

FIG. 5. Structural formulae of d-limonene and its oxidation products.

and the relative stability of so-called "terpeneless" oils from which the d-limonene has been removed contribute to this point of view. For this reason, infrared absorption curves of fresh and oxidized d-limonene were obtained. These spectra showed the same differences in the same regions as those shown by fresh and oxidized orange oils. This was considered tentative proof that limonene might be responsible for the "off" odors of oxidized orange oil. Previous investigators *(15)* have shown that carvone and carveol (see Figure 5) are present in air-oxidized d-limonene. These would account for the hydroxyl and the carbonyl absorption bands in both oxidized limonene and oxidized orange oil.

Because it appeared that carvone and carveol, at least, were logical oxidation products of d-limonene and hence might be expected to be present in autoxidized orange oil, it was decided to add these substances to fresh orange oil and then compare the infrared absorption spectra of this mixture with that of the "terpeney" orange oil that had been used as an odor standard in the selection of the odor panel. It was not known, however, what the relative proportions of carvone and carveol were in the oxidized oil nor what their absolute concentrations were. As a rough estimate of the amount necessary, it was decided to prepare a 50-50 mixture by weight of pure carvone and carveol. This mixture was then added to a fresh oil sample until the refractive index of the mixture was practically equal to that of the "terpeney" sample. An infrared absorption spectrum of the mixture was then obtained.

Figures 6 to 8, inclusive, show a comparison of the only regions of the spectra in which differences occurred between the mixture of fresh oil, carvone, and carveol and the "terpeney" sample. In both Figure 6 (hydroxyl region) and Figure 7 (carbonyl region) the differences are quantitative rather than qualitative, for the hydroxyl and carbonyl bands of both samples show greater absorption than the fresh oil alone. Figure 8 shows that some compound absorbing in the phenyl region is present in the "terpeney" sample which is not present in the fresh oil-carvone-carveol mixture. This would indicate that carvone and carveol are not the only reaction products resulting from the autoxidation of orange oil.

Tentative indications have been obtained that this compound is probably not p-cymene, which would seem a logical possibility. However, the true identity of the substance causing the phenyl absorption has not been determined.

The probable presence of carvone and carveol in oxidized orange oil having been shown, it now became of interest to show whether these compounds were responsible for the "terpeney" odor associated with oxidized orange oil. This was done by submitting to the odor panel paired samples of the fresh oil-carvone-carveol mixture and the "terpeney" sample. Table 3 shows the results of these tests. As can be seen, only one of the observers [c] indicated by his responses that a significant difference existed between the two samples.

[c] A score greater than 75% difference judgments in 20 tests.

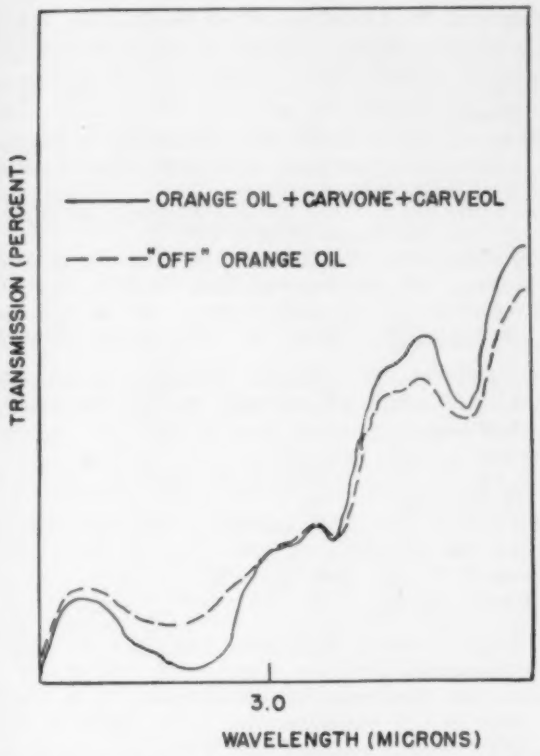

FIG. 6. Infrared absorption spectra of fresh orange oil mixed with carvone and carveol and of "off" orange oil in the vicinity of 3.0 microns.

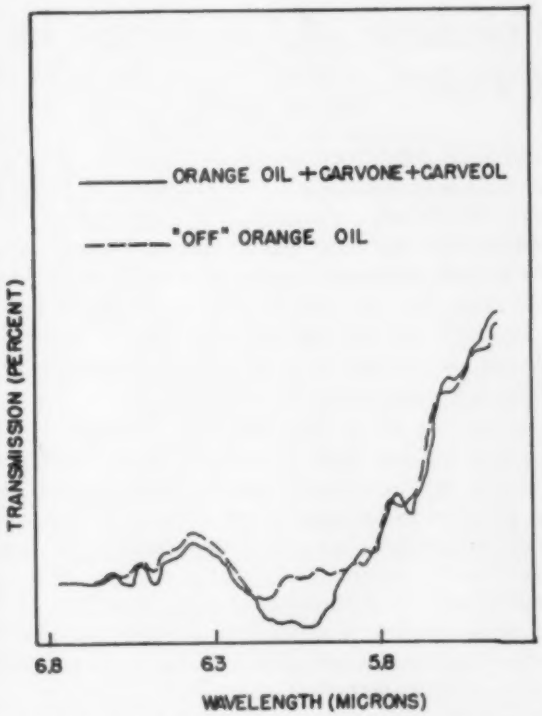

FIG. 7. Infrared absorption spectra of fresh orange oil mixed with carvone and carveol and of "off" orange oil in the vicinity of 5.8 to 6.8 microns.

This particular observer happened to be especially sensitive to the "terpeney" odor and in many tests scored consistently high, usually in the neighborhood of 90% difference judgments or better. As can be seen, his score in this case is well below his usual 90%. Furthermore, if the usual pooling of results is carried out, the average for all the observers is only 70%.

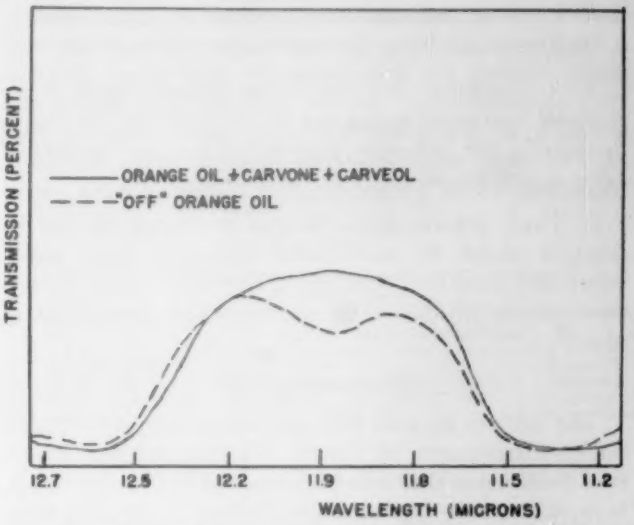

FIG. 8. Infrared absorption spectra of fresh orange oil mixed with carvone and carveol and of "off" orange oil in the vicinity of 11.2 to 12.7 microns.

TABLE 3

Paired Comparison Odor Tests on Terpeney Orange Oil and Fresh Orange Oil with Carvone and Carveol Added

Observer	Number of Trials	Percent Difference Judgments	Significance
1	20	55	No significant diff.
2	20	85	Significant diff.
3	20	70	No significant diff.

Avg. % Diff. Judgments = 70.

It would appear from these data then that, if a difference existed in the odors of these samples, it was slight.

Discussion and Conclusions

As can be appreciated from this presentation, the results obtained cannot be called quantitative in the strict sense of the word. Further work, such as the isolation of pure crystalline derivatives and the quantitative determination of reaction products should eventually throw further light on this problem. However, aside from the actual results obtained, the data illustrate how combinations of some of the newer physical methods and properly designed, statistically sound organoleptic techniques can contribute to the solution of odor problems.

From this study, the following conclusions can be drawn:

1. "Terpeney" orange oil, which is commercially unacceptable, contains substances absorbing in the hydroxyl, carbonyl, and phenyl regions of the infrared spectrum.

2. The absorption in the hydroxyl and the carbonyl regions is probably due mainly to carvone and carveol, which are reaction products from the air oxidation of d-limonene.

3. The presence of carvone and carveol in deteriorated orange oil is responsible for the so-called "terpeney" odor.

4. Carvone and carveol are present in approximately a 50-50 mixture by weight in oxidized orange oil.

5. A compound absorbing in the phenyl region of the infrared spectrum is present in the oxidized oil but is apparently not primarily responsible for the "terpeney" odor of orange oil.

6. These deteriorative changes in orange oil can be brought about by accelerated oxidation tests under controlled conditions requiring the absorption of approximately 6,000 to 8,000 cu. mm. of oxygen per gram of oil.

Acknowledgments

The authors express their appreciation to the Bruce's Juices Corporation of Tampa, Florida, for the Industrial Fellowship that aided in these studies, and to members of the industry who contributed advice and samples. Thanks are due especially to Dr. Richard C. Lord and his colleagues of the Spectroscopy Laboratories at the Massachusetts Institute of Technology for their aid, encouragement, and advice in the infrared absorption phases of this investigation.

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Certain Inaccuracies in the Determination of Coliforms in Frozen Orange Juice[a]

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No coliform organisms were isolated from 62 samples of commercially packed orange juice. Lactose fermenting yeasts occurring in orange juice cause false positive results with standard lactose broth and in large inocula, with brilliant green lactose bile and lauryl sulfate tryptose broths. Colonies of some of these yeasts bear a very close similarity to colonies of Escherichia coli when transferred to eosin methylene blue agar.

Wolford and Berry *(4, 5)* have reviewed much of the literature relating to the bacteriology of citrus juice. These authors showed the presence of *Aerobacter* and coliform intermediates in slime from a citrus processing plant. Such a condition conceivably might result in a significant number of these organisms in citrus juice. Their studies on the effect of storage of frozen citrus juice at —17.8° C. demonstrated a decrease in total count, yeasts, molds and coliforms. Although there was no consistent decrease in the number of positive presumptive tests between one month and seven months' storage, the uniformly negative confirmed and completed tests after the first month of storage of coliform contaminated samples indicate the rapid elimination of coliforms on storage and the spurious nature of the positive presumptive tests.

The present study was made to determine whether brilliant-green lactose bile broth or lauryl sulfate tryptose broth would decrease appreciably the number of false positive presumptive tests obtained from lactose fermenting yeasts when standard lactose broth is used. A number of samples of frozen orange juice were examined also to determine whether coliforms of fecal type were present and further studied to determine whether *Escherichia coli* would multiply in orange juice at room or refrigerator temperatures.

Materials and Methods

Sixty-two samples of frozen unpasteurized orange juice were examined for total number of bacteria, yeast, molds and for coliforms. The samples were examined in groups of eight by allowing the contents of the cans to melt in running cold water after which they were shaken vigorously, opened aseptically and 3 30.0 ml. samples removed from each. The remainder of certain

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, California, July 12, 1949.

[b] The samples of frozen citrus juice for these experiments were furnished to the authors through the kindness of R. M. Hagen of the California Consumers Corporation and W. E. Baier and J. W. Stevens of the California Fruit Growers Exchange.

samples was utilized for inoculation with pure cultures of *Escherichia coli*. The acidity of each 30.0 ml. sample was neutralized with sterile NaOH using sterile brom thymol blue as the indicator. Tryptone glucose agar was used to obtain the total bacterial count and Saboraud's glucose agar for the yeast and mold counts. The dilutions plated were equivalent to 0.1 ml., 0.01 ml. and 0.001 ml. of the undiluted juice.

In the qualitative examination for coliforms, inocula of 10.0 ml., 1.0 ml. and 0.1 ml. were placed in brilliant green lactose bile broth, lauryl sulfate tryptose broth and standard lactose broth in the Graves modification of the Durham type fermentation tube. Double strength media were used in all tubes receiving the 10.0 ml. inoculum. All media were inoculated simultaneously and incubated at 37° C. using the standard procedure for the examination of water *(1)*. All broth tubes were examined for the presence of gas at 24 hours and 48 hours and those showing gas in any amount were streaked on eosin methylene blue agar. These plates were incubated at 37° C. for a minimum of 24 hours. Microscopic examination of organisms from representative colonies was made and organisms from the colonies were reinoculated into the three lactose broth media.

Preliminary tests to determine whether *Escherichia coli* would multiply in orange juice were made by inoculating known concentrations of a pure culture of these organisms into three sets of five replicate samples of orange juice at pH 4.45. One series was maintained at room temperature, another in the refrigerator at 7° C. and the third series was quick frozen in glycerol and dry ice and maintained at approximately —15° C. The juice was sampled at 24 hour intervals for five days by plating directly on Eosin methylene blue agar to determine the number of *Escherichia coli* surviving. Each plating was made from an independent tube so freezing and thawing would not be a factor in the experiment. These experiments were replicated on 11 different occasions.

Results

The total count of all samples of frozen orange juice examined in this laboratory using Saboraud's dextrose agar and tryptone glucose agar are shown in Table 1. The samples are divided into three groups. Groups 1, 2 and 3, respectively, show counts obtained within one, two and three weeks after receipt from the processing plant. A gradual decrease of numbers with time is evident.

TABLE 1

Counts

		Organisms per cc.		
		Highest Count	Mean Count	Lowest Count
Group I	1	16,000	10,000	6,000
	2	24,000	11,000	6,000
Group II	1	11,000	7,000	5,000
	2	9,000	8,000	5,000
Group III	1	7,000	5,500	3,000
	2	5,000	3,000	2,000

1—Saboraud's. 2—glucose tryptone.

The results of Table 2 demonstrate that gas formation was positive in all tubes of standard lactose broth but only in the 10.0 ml. amounts in the brilliant green lactose bile and the lauryl sulfate tryptose media. Several different colony types were obtained on streaking from the tubes to eosin methylene blue agar, and all types were examined microscopically and reinoculated

TABLE 2

Numbers of Positive Presumptive Tests from 62 Samples of Frozen Orange Juice

Sample ml.	Media Used in Tests		
	Standard Lactose Broth	Brilliant Green Lactose Bile	Lauryl Sulfate Tryptose
10.0	62	55	54
1.0	62	0	3
0.1	62	0	0

into the three types of media. Certain atypical colonies were noted which proved to be formed by Gram-negative, non-spore forming short rods which on subculture into lactose broth failed to produce acid and gas. Therefore, all 62 samples were uniformly free of coliform types.

Inoculations of known numbers of *Escherichia coli* were made into orange juice to study the survival and possible multiplication at three different temperatures. An apparent increase in numbers of coliforms at room temperature was noted when colonies apparently typical for *Escherichia coli* were counted, i.e., round slightly raised colonies with dark, almost black, centers showing a greenish metallic sheen when viewed by reflected light. Microscopic examination of the colonies demonstrated that only a minor portion were formed by *Eschericha coli;* the greater number were produced by lactose fermenting yeasts. The yeasts will produce gas when inoculated into lactose broth but will not produce gas in the other two media. These results demonstrated that no reliability could be placed on platings made directly into eosin methylene blue agar. The results summarized in Table 3, for this reason, do not show

TABLE 3

Survival Time of Escherichia coli in orange juice
(Summary of 11 samples pH 4.45)

E. coli/ml.	Days of Storage														
	Room temperature					Refrigerator (7° C.)					Frozen (—15° C.)				
	1	2	3	4	4	1	2	3	4	5	1	2	3	4	5
300,000	+	+	+	o.g.	o.g.	+	+	+	+	+	3 of 11 +				
30,000	+	+	+	o.g.	o.g.	+	+	+	+	+	—	—	—	—	—
300	+	+	+	o.g.	o.g.	+	+	+	+	+	—	—	—	—	—
3	*	—	—	o.g.	o.g.	+	+	+	—	—	—	—	—	—	—

o. g.—overgrown.
*Thirty-seven "typical" coliform colonies on E. M. B. agar were produced by lactose fermenting yeasts.

numbers of microorganisms present but only positive or negative results as to whether *Escherichia coli* survived. In order to secure these results, it was necessary to examine the typical colonies on each plate until those formed by Gram-negative rods were discovered. These were inoculated into the three lactose media in which they would uniformly produce gas. The orange juice samples maintained at room temperature were so over-

grown by yeasts and molds after 72 hours that no further determinations could be made. *Escherichia coli* could be recovered from the samples kept in the refrigerator at the end of five days in all cases except where the original inoculum was three organisms per milliliter. Only three of eleven samples that were quick frozen had viable coliforms at the end of five days and these were only present in the samples inoculated with 300,000 organisms per milliliter.

Discussion

A gradual decrease in numbers of microorganisms took place during storage at the laboratory at —15° C. This is in agreement with the results of other investigators working on similar problems.

From previously published results the authors expected to find an appreciable number of the 62 samples of frozen orange juice examined yielding completed coliform tests in the 10.0 ml. and 1.0 ml. aliquots. The results clearly indicate that no coliform organisms were present in the frozen juice although if the results of the false-positive presumptive or confirmed tests only had been considered all samples would have been labelled positive. The next most striking point was the futility of using eosin methylene blue plates for a confirmed test when lactose fermenting yeasts exist that can give colonies identical in appearance to *Escherichia coli* on this medium. It seems rather important that a survey be made to determine whether these yeasts are present in other citrus juices than orange juice and whether they are found in different sections of the country. If they are widely distributed then the presumptive test for determining coliforms in citrus juice should be made using brilliant-green lactose broth media. While this medium has not been effective in preventing gas formation by yeasts when 10.0 ml. inocula were used it has apparently been successful in eliminating the particular species which has given results identical with *Escherichia coli* on the eosin methylene blue agar.

These false positive presumptive tests may originate in some cases because the orange juice introduced into the fermentation tube contains sucrose and dextrose which can be fermented with the production of acid and gas by many organisms beside the coliform group. The fact that brilliant green lactose bile and lauryl sulfate tryptose broths lose their selectivity when large amounts of orange juice are introduced into these media but retain their selectivity when smaller amounts of orange juice are used or when organisms from the plates are reinoculated into these media in which they originally grew indicate that they must be used with caution. In the 62 samples of frozen orange juice examined the false positive presumptive tests developed in part from lactose fermenting yeasts which were present in every sample.

The atypical colonies present on eosin methylene blue agar proved to be other yeasts which did not ferment lactose, lactobacilli and Gram-negative, non-spore forming short rods which did not ferment lactose with the production of acid and gas. The latter may possibly be species of *Erwinia* of which only 6 of the 22 species produce acid and gas in lactose broth. Certain of these organisms might be expected in oranges used for juice since the gas producing strains are all included in the causative agents of soft rots.

The fact that *Escherichia coli* inoculated into orange juice remained viable longer at room and refrigerator temperatures than in quick-frozen juice probably may be explained by the short holding period used in this experiment. Schrader and Johnson *(3)* demonstrated that the death rate of *Escherichia coli* in orange juice is most rapid at 37° C., slower at 25° C. and slowest at —12° C. These latter results are more in agreement with the results obtained with other survival experiments in fruits and fruit juices. Owing to the apparently typical *Escherichia coli* type colonies produced by the lactose fermenting yeasts in these experiments it was impossible to secure a quantitative count. It will be necessary to extend the holding periods in these experiments before a definite answer can be given. The results, however, are not inconsistent with those obtained by Bundesen *(2)* who has found the "coliform" group present in 57 samples of unfrozen citrus juice collected in Chicago but not in samples of frozen citrus juice.

Summary

Brilliant green lactose bile and lauryl sulfate tryptose broths will not prevent false positive presumptive tests when large amounts of orange juice are used as inoculum. Certain lactose-fermenting yeasts are present in frozen orange juice which give colonies identical in appearance to those of *Escherichia coli* on eosin methylene blue agar. No members of the coliform group were found in 62 samples of commercially packed frozen orange juice.

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Some Fundamental Considerations in the Processing of Frozen Orange Juice Concentrate[a]

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Factors affecting the flavor of frozen concentrated orange juice were studied using a taste panel with above-average discrimination and ability to duplicate results.

Among the variables included in tests were source and maturity of fruit, also juice extraction, deaeration, pasteurization, handling, concentrating, blending, packing and freezing, as well as the effect of total count, oil and time of storage. Observations are summarized in figures.

Introduction

Frozen orange juice concentrate is the most spectacular news item in the food business today. An item completely unknown commercially in 1944, the total pack in 1946 has been estimated at less than one million 6-ounce cans. In 1949 the total pack will exceed 200 million 6-ounce units and will consume 14% of all juice oranges raised in Florida, plus an additional quantity from California.

In 1950 it is expected to outsell the old established leaders, frozen peas and frozen strawberries.

Claims to paternity of the new item are being advanced by several companies. It is interesting to point out, with no reference to any particular claim, that work in the General Foods Central Laboratories had advanced to such a stage that on January 12, 1944, a project was initiated bearing the title "Concentration, Freezing and Cold Storage of Orange Juice for Freezing Cabinet Distribution"—a rather prophetic title in the light of present developments.

In the season 1946-1947, a traveling pilot orange juice plant, with a daily capacity of 12,000 cans, was designed and installed at Highland City, Florida. At the season's end it was loaded on a railroad car, shipped to Hollywood, California, and reassembled for the duration of the California season. This unit is now operating on its fifth season in three years: 3 seasons in Florida, 2 in California.

The exploratory projects previously referred to had established the laboratory objective: an orange juice concentrate to be stored at commercial frozen food storage and distribution temperatures and with a high enough initial quality and sufficiently good storage characteristics to bear our brand name. In this paper the authors wish to present:

(1) The work that preceded and culminated in pilot plant design, and
(2) The work now going on as a result of pilot plant and commercial observations over two years.

Plan of Attack

The prime objective of the study was to find out which of the basic processes developed theoretically from earlier explorations would produce an orange concentrate that upon reconstitution would yield the best tasting orange juice. Initially, four fundamentally different laboratory methods were considered as possible starting points for this experimental approach.

Shortly after the initiation of the program, it became apparent that frozen concentrates underwent flavor changes during storage. Since it was assumed samples prepared by the four laboratory processing methods would not change at the same rate or in the same direction, it was planned to reevaluate the methods against each other at regular storage intervals. For purposes of comparison, unprocessed, reamed, single strength juice was also packed frozen with each series, thereby enlarging the basic series to five.

Aside from the two major objectives—(1) appraisal of processing methods on freshly prepared samples, and (2) appraisal of samples stored for various lengths of time, many other studies were simultaneously conducted. These included possible raw material variables, such as source of oranges, size, Brix/Acid ratio, maturity, percent soluble solids, pH, and also a study of modifications of the basic processing methods. A third series of experiments was also started in which an attempt was made to prevent or delay flavor changes during storage.

In order to take into consideration the changes in raw material throughout the season, shipment of oranges was processed every week representative of grove-ripened fruit, picked and washed shortly before being sent to our laboratories at Hoboken. The four basic processing methods, in addition to various modifications, were run on each shipment of Florida fruit as well as each shipment of California fruit. By obtaining representative values of Vitamin C content, citric acid, soluble solids, yield of juice, and flavor score on each fruit shipment, it was possible to keep a running record of the fresh juice characteristics throughout the entire Florida and California Valencia season. Data accumulated were recorded for later study in conjunction with basic processing data.

As soon as the processing of a shipment was completed, the four methods were taste-tested against a freshly burred and screened juice sample from the same shipment. These taste tests were repeated at two month intervals on products of the four basic methods, together with a sample of single strength juice extracted from the same shipment of oranges, vacuum canned, frozen, and stored under the same conditions and for the same length of time as the corresponding processed samples. Records of the bacteriological picture prior to and during processing as well as on storage of the respective shipment were also completed. A total of 15 shipments of Florida Valencia oranges, followed by 13 shipments of California Valencia oranges, covering the periods January to June for Florida and June to Octo-

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, California, July 13, 1949.

ber for California, were processed. The early shipments ranged from 2 to 5 crates per week. These were gradually increased to allow the modifications to an average 20 crates per week.

Description of Basic Processes

The basic methods used in the experimental study were as follows:

Method A—Flash Evaporation—Aroma Recovery Process

Juice was prepared by squeezing oranges in Universal juicer, straining through 10 and 35 mesh stainless steel strainers to remove pulp and seeds, and then concentrated to 48° Brix by use of a flash evaporation apparatus in which the juice was permitted to flow over a very slightly inclined surface heated by a steam chest. Evaporation to 4-fold strength was a matter of seconds only. Fresh juice feed rate was 220 milliliters per second and steam pressure in the chest was approximately 65 pounds per square inch. The evaporating sheet was equipped with a hood wherein the first 10 to 25 percent of condensate containing most of the aromatic fractions could be recondensed. After the run was completed, these aromatic fractions were returned to the 48° Brix concentrate to bring concentration down to 40° Brix. The product was then packed into cans under vacuum and frozen.

Method B—Pasteurize—Concentrate Process

Juice was prepared by squeezing oranges in Universal juicer, straining through 10 and 35 mesh strainers to remove pulp and seeds, and then deaerating by placing in a glass evaporator and subjecting the juice to a vacuum. After deaeration, the material was pasteurized in a special laboratory unit which required a total of 6 seconds to heat the juice to 190° F. (88° C.) at a feed rate of 900 milliliters per minute and cooled to 80° F. (27° C.) in 6 seconds. After pasteurization the product was concentrated under vacuum at 85° F. (30° C.) to 55° Brix. Evaporation rate was 60 milliliters of water per minute and concentration time varied from 60 to 90 minutes, depending on the volume of the original charge. The 55° Brix concentrate was then blended back to 40° Brix with freshly pasteurized juice, packed into cans under vacuum and frozen.

Method C—Freeze Concentration Process

Juice was extracted by reaming on a Sunkist high speed extractor, screened through 10 and 35 mesh screen, and deaerated in a vacuum-pot deaerator. The product was then placed in stainless steel beakers and frozen rapidly by immersion of the container in refrigerated brine. The slush-frozen juice was broken up with a spatula and the ice-concentrate mixture centrifuged in the Tolhurst stainless steel perforate basket centrifuge. The 4-fold concentrate thus produced was vacuum-packed in tin cans, and frozen. No cutback juice was added in this process.

Method D—Florida Citrus Commission Process

Juice was prepared by squeezing oranges in a Universal juicer, straining through 10 and 35 mesh strainers to remove pulp and seeds, and then concentrated under vacuum at 85° F. (30° C.) to 55° Brix. Evaporation rate was 60 milliliters of water per minute and concentration time averaged 75 minutes. The 55° Brix concentrate was then blended back to 40° Brix with raw (unpasteurized) juice. The entire 40° concentrate was packed into cans under vacuum, and frozen. This process is essentially that suggested by the Florida Citrus Commission and developed experimentally in their laboratory at the experiment station then in Winter Haven, Florida.

Method E—Single Strength Frozen Juice (Control)

Juice was extracted by reaming oranges on a slow-speed Hobart reamer, and straining through 10 and 35 mesh screen to remove pulp and seeds. The product was then deaerated under vacuum in the glass laboratory evaporator until foaming ceased. The deaerated juice was then vacuum-packed and frozen. No heat was applied at any time.

* * *

As the work progressed it was found necessary to make minor changes in the various processes, but these have little significance here. Eventually, a very complex program developed. The more important results derived therefrom will be reported here.

Evaluation of Samples by Taste Panels

One, if not the most difficult phase, of this type of research is the assay of flavor quality and change in some quantitative, and if possible, objective terms. In General Foods we use many different techniques of varying degrees of reliability for product evaluation and consumer acceptance; namely, bench test, expert panel test, store test, consumer test, and market test. Due to the limitations and number of samples, materials available and time involved, research on the fundamental characteristics of orange juice has been guided primarily by expert panel evaluation.

The selection of judges for an expert panel is made on the basis of screening tests. Since this kind of panel is primarily for discerning differences rather than measuring consumer acceptance, the screening was based on a series of tests in which three samples were presented in duplicate and the judges asked to match the duplicates. This test is recognized as a measure of the individual's ability to discriminate between samples and to discern differences. Table 1 shows the probability of matching duplicate samples by chance alone.

TABLE 1

Taste Testing Statistics

	Possibility of Matching By Chance Alone in 15 Trials	Corrected Weighting Factor [b]
Matching 3 Pairs	1 Chance in 15	8.0
Matching 1 Pair	6 Chances in 15	1.3
Matching 0 Pairs	8 Chances in 15	1.0

[b] In utilizing these weighting factors for statistical calculations of panel performance, corrections had to be applied to allow for the unequal difficulty of the tests.

The results of the judges were weighed to take into consideration the probability of chance matchings. Fig. 1 shows the rank of 26 individuals in the first screening.

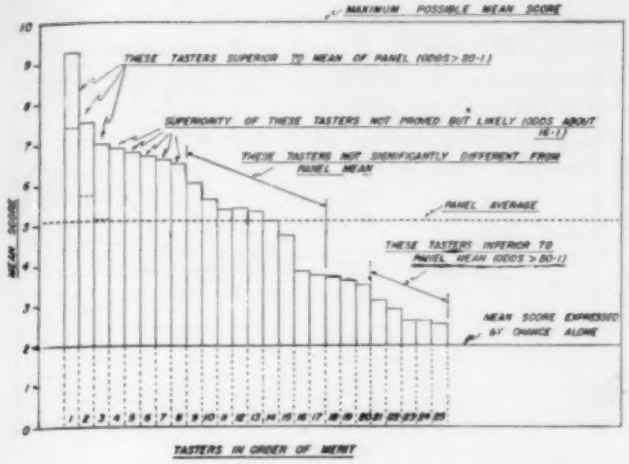
MAXIMUM POSSIBLE MEAN SCORE
THESE TASTERS SUPERIOR TO MEAN OF PANEL (ODDS > 20-1)
SUPERIORITY OF THESE TASTERS NOT PROVED BUT LIKELY (ODDS ABOUT 10-1)
THESE TASTERS NOT SIGNIFICANTLY DIFFERENT FROM PANEL MEAN
PANEL AVERAGE
THESE TASTERS INFERIOR TO PANEL MEAN (ODDS > 20-1)
MEAN SCORE EXPRESSED BY CHANCE ALONE
MEAN SCORE
TASTERS IN ORDER OF MERIT

FIG. 1. Screening test for average juice taste test panel.

The important observation here is that individuals vary widely in their ability to discern differences as well as in their taste preferences!

The results and values of such an expert panel should be treated as relative rather than absolute. For best results, one should always have a point of reference in the series and keep in mind the fact that the environment (i.e., the other samples in the test) has a marked influence in absolute impressions, remarks and quality scores.

A jury of 10 to 14 persons was used on the Taste Test panel for the frozen orange concentrate program. This panel met three times daily. Each tester filled out separate ballots and evaluated for flavor and general acceptability. Comments were required. After each test the ballots were collected and a summary written which gave total score, mean score, and number of firsts. Also, the comments on each ballot were examined and a general summary, including particular remarks about the samples and the tests, made on the summary sheet. Much of the information for this report was obtained from these summary sheets.

According to this scheme of Taste Test scheduling, samples prepared from each particular fruit lot were compared immediately after preparation, with a fresh juice control and at two-month intervals thereafter.

All samples for taste tests were prepared in the laboratory 30 minutes before the test and served to the panel in the test kitchen. The frozen concentrates were removed from storage two hours before the test and allowed to thaw at room temperatures. Concentrates were reconstituted with spring water, aerated and served at a fresh juice temperature of 72° F. (22° C.), with not more than one degree temperature difference among samples. Five samples were usually submitted to the panel to be tasted blind. These included a set of duplicates in about two out of every three taste tests. The insertion of duplicate samples was made to test on the tasting ability of the taster for that particular day. Also, it made it possible to collect statistical records for the purposes of maintaining an accurate panel. In summarizing the total scores for a particular test, all tasters who failed to match duplicate samples within 1.5 points were eliminated and their scores not included in the totals. Each average value established represented 5 to 19 taste tests.

All taste test values used in this record are values assigned to indicate degree of excellence according to a scale beginning with excellent at 10 points, then good, fair, poor, very poor, etc., to zero points.

As a further check on the laboratory panel, duplicate samples were submitted to the Bireley laboratory (Bireley's Division, General Foods Corporation, Hollywood, California). A similar panel, using the same technique, was drawn from Bireley's executives, laboratory and plant personnel, where each test was repeated in an entirely different atmosphere to that prevailing in the Hoboken laboratory. Results of the separate test groups were so close as to require little or no discussion in this report.

Experimental Observations

A. *Effect of Process on Initial Quality and Storage Characteristics*

Taste test evaluations on the five basic methods are available through 12 months' storage. These data have been plotted and are shown in Fig. 2.

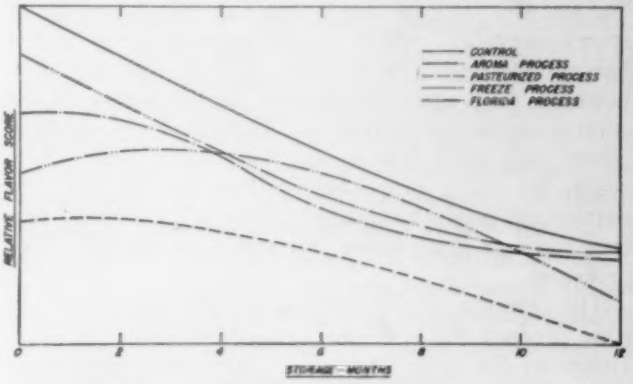

FIG. 2. Taste test results showing effect of process on initial flavor and storage characteristics of frozen orange juice concentrate using Florida Valencias.

It is significant that the freeze concentration method most nearly approaches the control on freshly prepared samples and that initial quality drops off in direct relation to the amount of heat to which the product is exposed during processing. After 12 months, the processes having had no treatment or only a very mild heat treatment have come together at about the same level as the fresh juice and have also leveled off in terms of flavor deterioration on storage. The more extensively heat treated samples still fall below this group in terms of average score after storage. It would appear that pasteurization of the concentrate and the cutback juice is readily apparent, both in initial quality and storage characteristics. The early increase in flavor score for the flash evaporation-aroma process is significant since it was observed that this particular product, when fresh, appeared to be unbalanced in relation to various aromatic components.

A similar presentation of the experiments on California fruit is presented in Fig. 3.

In the case of California fruit, initial samples, with the exception of the single strength control, appear to

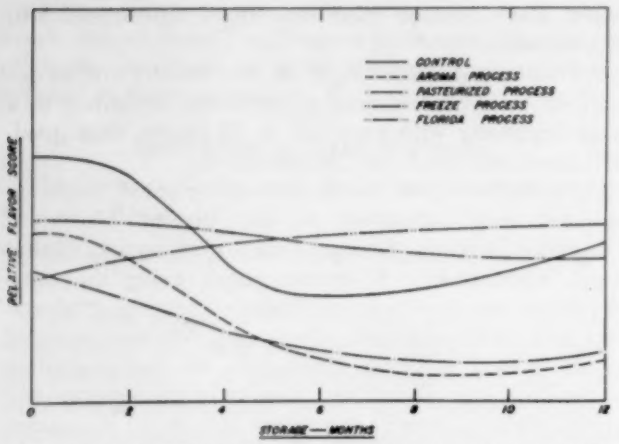

FIG. 3. Taste test results showing effect of process on initial flavor and storage characteristics of frozen orange juice concentrate made from California Valencia oranges.

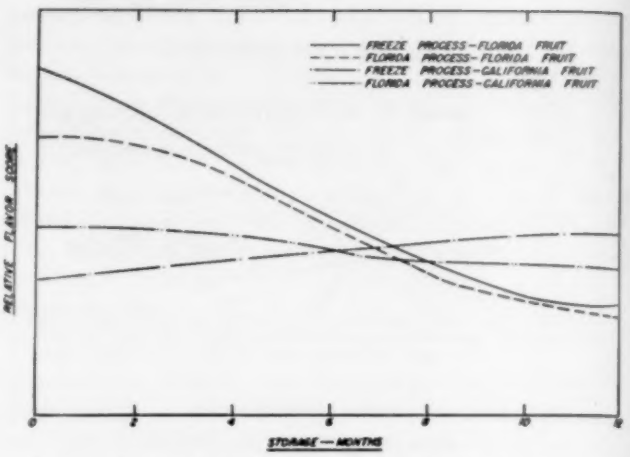

FIG. 4. Comparison of the initial flavor scores and storage characteristics of Florida and California Valencia oranges.

be more closely grouped than was true with the products made from Florida fruit. Both the initial score and the storage behavior patterns seem to indicate a real difference between the California product and that from Florida. Heat effects appear to be much less serious and this may be due to the fact that lower initial scores prevailed, which would suggest lower initial flavor in the California product. Storage after one year, however, once again emphasized the bracketing of the control, freeze concentrate, and Florida process product where only mild heat applications were used. Once again, the flash evaporation-aroma process and the pasteurized product appeared to follow the Florida pattern, having a much lower year-end score than the other processes.

The behavior of the control and the frozen concentrate product would suggest abnormalities in the data. However, the large number of taste tests supporting these observations made it improbable that the points were erroneous. A study of the comments by the taste panels emphasizes the fact that a high quality freshly prepared California juice appears to have a "green or grassy" characteristic, which is unpleasant to many people. It is also less likely to be as well balanced in terms of aroma, sugar and acid as the Florida product. All of these characteristics appear to level off during storage, producing a softening effect on the flavor which evidences itself in a less objectionable score by the taste panel.

For direct comparative purposes between California and Florida fruit Fig. 4 has been prepared showing the two high scoring processes only.

It is immediately evident from this curve that the behavior patterns of the products from the two localities are quite different.

B. *Effect of Maturity.*

In an effort to determine the behavior patterns of the various basic processes as related to fruit maturity, Fig. 5 has been prepared.

Because of the limited number of samples available, these studies were only carried out over a 4-month period. It is interesting to note the apparent change in behavior patterns as the season progresses. Here again,

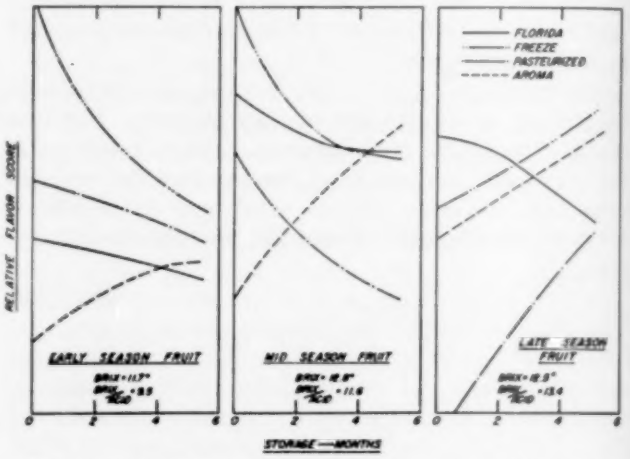

FIG. 5. Study of fruit maturity relative to processing methods for Florida Valencia.

it would appear that the freeze concentration technique is superior to other processes throughout the season. The Florida process suffers with the use of early season fruit due to the fact that it is dependent for its superiority on the quality of aroma carried into the juice by the small percentage of cutback juice added to the concentrate. Since aroma is low in early season fruit, it is to be expected that this particular process would fall below normal quality.

The unnatural character of aromatic fraction recovered from the flash evaporation-aroma process, makes this particular process receive a lower score as the percentage of aroma increases throughout the season, with the score actually improving as storage changes modify the unpleasant aroma character. In much the same manner the overripe aroma in the frozen concentrate and the cooked flavor in pasteurized concentrate are modified on storage to become more acceptable whenever late season fruit is used. Obviously, a study of these behavior patterns requires mass repetitive data over a period of years. It may be theorized, however, that characteristic process flavors may be influenced by the maturity of the fruit and the storage pattern of the product may change, depending upon maturity variations.

In order to further show the effect of fruit maturity, the California experiments were broken down into two groups. The first of these included all shpiments with a low Brix/Acid ratio, averaging 9.4, and the second included all shipments with a high Brix/Acid ratio, averaging 11.2. These data have been tabulated in Table 2.

TABLE 2

Study of Fruit Maturity Relative to Processing Methods on California Valencias—No Storage

Brix/Acid Ratio	Average Brix	Taste Score			
		Aroma Process	Pasteur. Process	Freeze Process	Florida Process
9.4	12.3	6.0	4.7	3.2	5.7
11.2	12.0	6.2	5.8	5.6	6.5

Here again, there is noted the different behavior pattern between California and Florida fruit. In this particular case, the "grassy" character, along with a slightly bitter character, was noticeably prevalent in early season fruit, which resulted in a scoring downward of those particular processes where the juice is treated most gently, notably the Freeze Concentration Process. As the fruit matures and the Brix/Acid ratio increases, the degree of grassiness or bitterness decreases, resulting in improved scores. However, the same relative pattern between processes prevails.

Another factor that should be noted in comparing the above information is the general agreement among orange processors that in extracting California fruit, particularly in high-speed burring equipment, most of those substances which are responsible for bitterness enter the screened juice. In our experiments, the Freeze Concentrate sample was made with burred juice to avoid a high peel oil level. It is possible that this may have influenced the relatively low scores for this particular process.

C. *Effect of Evaporation Temperatures*

The effect of concentration temperature on the final flavor and the storage characteristics of the product was studied with both California and Florida juice.

Very low temperature evaporation runs were made by ice sublimation techniques and represent an ideal approach to the problem. The laboratory data are not too conclusive; they indicate a slight reduction in quality due to evaporating at —4° F. (—20° C.) as compared to 77° F. (25° C.), a leveling off at a lower flavor level between 77° F. and 95° F., and a significant drop when the temperature of evaporation goes beyond 95° F. (35° C.). Because of the difficulties inherent in running such experiments on laboratory size quantities, the inferences drawn from these laboratory observations have been subsequently checked in pilot plant size equipment over some rather extensive operating runs. All of the data seem to support the conclusion that an upper limit of about 95° F. (35° C.) for concentration temperature is imperative for the prevention of cooked flavor in the freshly processed samples.

Cooked flavor identified on initial testing has been equally prominent on storage. No cooked flavor has developed during storage which was not present on initial sampling. Samples prepared by Freeze Concentration show a better average score than those prepared by any conventional evaporator within practical evaporating temperatures. Evaporating temperatures above 95° F. (35° C.) should be avoided.

D. *Effect of Rate of Freezing*

The rate of freezing of the finished product was studied by freezing vacuum canned samples in (a) acetone and dry ice, (b) agitated air at 32° F. (0° C.), (c) still air at 0° F. (—18° C.) with the cans closely packed, (d) still air at 32° F. (0° C.) for 24 hours, then 0° F. (—18° C.) air.

Results available from this series as well as from additional and more comprehensive data on both pilot plant and commercial size operations do not show any significant differences for reasonable commercial freezing rates. It was therefore concluded that normal blast freezing, immersion freezing, or cold room freezing, would result in no adverse qualities appearing in the products if normal bacteriological and enzymatic precautions were observed.

E. *Effect of Added Sugar*

Taste test results on undermature fruit indicated low acceptability, particularly for the Florida process, with specific criticism of high acidity. Samples were packed in which the low Brix/Acid ratio was adjusted to 13 by the addition of sucrose. Taste test averages did not show a distinct preference for the adjusted series. It is felt, however, that this obesrvation may well be valid for an expert taste panel but not necessarily so if one were attempting to interpret operations in the light of consumer preference rather than expert panels. In addition, the particular season in which these experiments were carried out was unusual in that it did not show the wide variation in Brix/Acid ratios normally expected. It is possible that the results might have been different had the variation been greater.

F. *Effect of Cutback Juice Temperature*

It has been previously said that the quality of the product resulting from the Florida process is to a very large degree dependent upon two factors: (a) the temperature of concentration, and (b) the quality of the cutback juice. The cutback juice in the Florida process is used as a vehicle for carrying aromatics back into the product. It was therefore assumed that the temperatures of this juice at time of reaming and time of blending might well be important factors in the quantity of aroma carried into the finished product. Samples were prepared using

(1) Room temperature oranges and concentrates at 50° F. at time of blending. This represents average plant conditions.

(2) 30° F. oranges blended with 15° F. concentrate, with blending carried out in 32° F. atmosphere.

(3) 32° F. oranges, 55° F. concentrate, blended at room temperature (70° F.). The results are shown in Table 3.

It would appear that low temperature reaming operation in conjunction with low temperature blending operation gives a preferred final frozen product. It is

TABLE 3

The Effect of Juice Temperatures at Time on the Flavor Score of Freshly Prepared Samples—California Valencias

70° F.-Cut-Back 50° F.-Concentrate 70° F.-Blending Rm.	30° F.-Cut-Back 15° F.-Concentrate 0° F.-Blending Rm.	30° F.-Cut-Back 55° F.-Concentrate 70° F.-Blending Rm.
6.4	7.1	6.9

assumed that this is due to the retention of more volatile aromas at the lower temperatures and that it would therefore be desirable to cool cutback juice as rapidly as possible below 32° F. and hold it at low temperatures until the final blending and freezing operation is completed. It would also appear desirable to pre-cool the concentrate before blending in order to obtain maximum quality.

G. *Effect of Deaeration*

The removal of air by vacuum-pot deaeration was found to be only about 70% efficient. In an effort to investigate the influence on initial quality and storage stability of more complete air removal, samples were prepared using a spray type deaerator, which was found to be effective to the point of 97% air removal. Results on freshly prepared samples averaged a flavor score of 6.7 for the undeaerated product and 5.8 for the thoroughly deaerated samples. A study of the scores and comments led to the conclusion that this difference in initial quality was probably due to definite and readily distinguishable losses in flavor and aroma which accompanied the thorough deaeration. Storage observations showed the two products leveling out at approximately the same point after one year.

It has been the authors' privilege to examine similarly deaerated products prepared at the Citrus Experiment Station in Winter Haven, Florida, and at the University of Florida Experiment Station in Gainesville with similar conclusions.

U. S. Patent No. 2,453,109, MacDowell, Moore and Atkins, assigned to the United States of America, includes deaeration as an operating step in each of their claims.

The conclusion drawn from experiments reported here would disagree with this, suggesting that ordinary commercial deaeration operations are more effective in removing aromas than in removing air with the net result that initial product quality suffers and storage characteristics are not materially improved.

H. *Effect of Vacuum Packing vs. Air Packing*

Quite a bit has already been published on the air packing of frozen orange juice concentrate versus packing in vacuum. The normal commercial operation today includes votating the concentrate to a slush-frozen condition before filling into the containers. This may whip air into the product which cannot be readily removed by the flash-type vacuum canning equipment.

In order to approach the problem from a strictly theoretical point of view, liquid concentrate at 38° to 40° F. was filled into containers and the product sealed (a) without evacuation, and (b) with a 28-inch vacuum on the vacuum sealing chamber. Results are summarized in Table 4.

TABLE 4

Effect of Packing Method on Flavor Score and Storage Characteristics of California Valencias

Storage Time in Months	Type Pack		
	Bottle Pack (Air)	Can Pack (Air)	Can Pack (Vacuum)
0	5.3	5.5	7.0
4	....	5.5	6.1
6	....	4.9	5.8
8	....	5.0	6.0
12	....	5.2	5.8

These results would indicate a distinct preference for vacuum packed samples over air packed samples throughout most of a 12-month storage period. However, the vacuum pack appears eventually to reach the same level as the air pack, probably due to the dissolved gases in the juice itself. No effort was made to remove these during packing, and the flash vacuum before crimping is of insufficient duration to do an effective over-all job.

I. *Effect of Adding Back Condensed Aroma*

Experiments on aroma recovery were made to find a method of (a) recovering and (b) preserving the volatile flavors of fresh orange juice. In one series of experiments the first 10 percent of distillate from vacuum concentration was recovered by means of low temperature condensation and added to a 6:1 concentrate to bring it back to 40° Brix. In another experiment a similar operation was carried out, and in addition Vitamin C was added to the distillate recovery flask to the extent of 1/10% ascorbic acid based on the total fresh juice. In a third experiment the distillate obtained in the first method was concentrated 10-fold, added to the 6:1 concentrate and this product then brought back to 40° Brix with cutback juice. Other variations were also tried. The second and third techniques mentioned above were voted consistently superior to the other samples. In general, however, none of these results were sufficiently outstanding on freshly prepared samples to justify more extensive exploration and, in fact, on storage most of the samples developed objectionable strawberry or apricot-like characteristics which were entirely foreign to orange juice.

J. *Effect of Cutback Juice*

Throughout this report, where the term cutback juice has been used, it has referred to the operation of concentrating the base product sufficiently beyond 40° Brix to permit of the introduction of at least 10% freshly reamed, unpasteurized, undeaerated juice. This technique, originally recommended by the Florida Citrus Commission with slight modifications, has the effect of reintroducing into the vacuum concentrate enough of the natural fresh fruit characteristics and aroma to make the product a very close duplication of fresh juice when properly reconstituted. In order to study the effect of this cutback juice addition on flavor score and stored samples, 40° Brix concentrates were made by direct evaporation and then canned and frozen without any cutback juice. This product was compared with the normal Florida process product wherein the

concentrate was evaporated to 55° Brix and then brought back to 40° Brix with freshly reamed single strength juice. Results are shown on Fig. 6.

It is obvious from the curve that a positive flavor contribution is made by the addition of cutback juice, both initially and over the entire storage period. Similar tests were carried out on California Valencias, data for which are not shown but the pattern revealed is essentially the same. These data confirmed the observations of the Florida Citrus Commission and substantiate their recommendation for inclusion of cutback juice in frozen

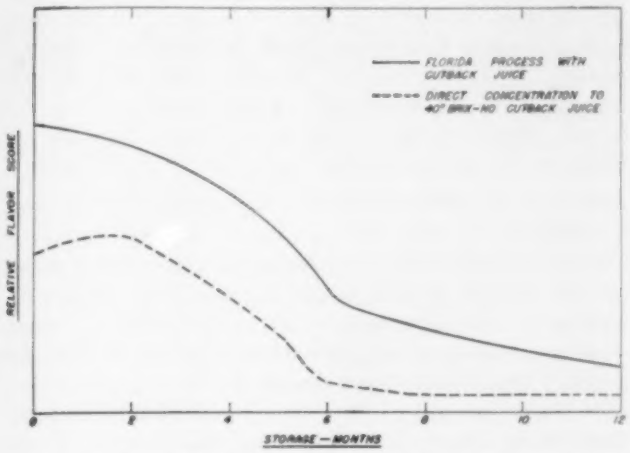
FLORIDA PROCESS WITH CUTBACK JUICE
DIRECT CONCENTRATION TO 40° BRIX-NO CUTBACK JUICE
RELATIVE FLAVOR SCORE
STORAGE—MONTHS

FIG. 6. Effect of cutback juice on initial quality and storage life of orange juice concentrate using Florida Valencias.

orange juice concentrates. No laboratory data are available to show the effect of varying amounts of cutback juice, since it was impossible to get concentrates beyond 60° Brix without encountering serious viscosity increases and reduced heat transfer rates which produced a cooked flavor. However, the additional quantity of cutback juice that could be added by concentration to 60° Brix rather than 55° Brix was either insufficient in these tests to produce a discernible flavor difference or the deterioration in quality of the concentrate due to possible heat damage offset the positive effects of additional cutback juice. This area is worthy of further investigation.

K. *Effect of Added Orange Oil*

There has been considerable discussion about the merits of high oil concentrates versus low oil concentrates, a problem which largely revolves around eventual consumer acceptance of the product. In an effort to accumulate data on this factor, samples were prepared in which the juice was carefully burred and an effort made to obtain an extremely low oil content raw juice. Concentrates with added cutback juice were made from this raw juice and modified as follows:

(1) Contained no added oil
(2) Contained .0018% by weight of 5-fold concentrated orange oil
(3) Contained .008% of single strength orange oil

These levels of acceptability were established by taste tests using the expert panel, and the oil used was highest quality California Citrus Exchange oil. From past experience these oils have been demonstrated as being essentially completely stable at —10° F. and it was felt that products with these additives might well be preferred to bland or unnatural flavors occurring in the stored samples of the basic series. Results are shown in Fig. 7.

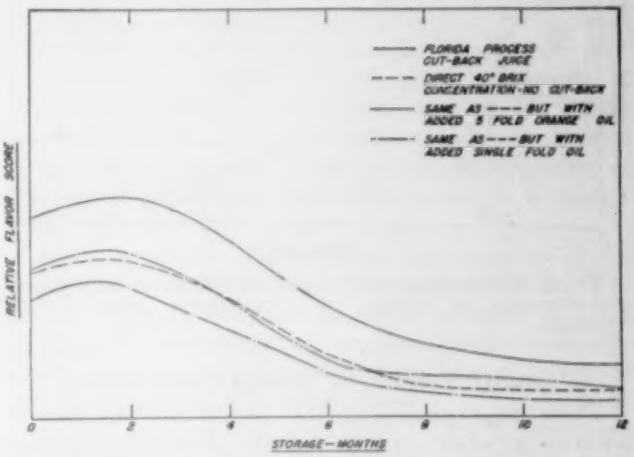
FLORIDA PROCESS CUT-BACK JUICE
DIRECT 40° BRIX CONCENTRATION-NO CUT-BACK
SAME AS ——— BUT WITH ADDED 5 FOLD ORANGE OIL
SAME AS - - - BUT WITH ADDED SINGLE FOLD OIL
RELATIVE FLAVOR SCORE
STORAGE—MONTHS

FIG. 7. Effect of addition of stable orange flavor oil on initial flavor and storage quality of orange juice concentrate using California Valencias.

It is obvious from the data that no advantage was gained by the addition of such oils insofar as our expert panels were concerned either with relation to initial quality or storage stability. It is interesting to note that the products with and without oil followed parallel behavior patterns. It was therefore concluded that added oil makes no contribution to stability.

L. *Effect of Pasteurization*

In general, it has been the authors' experience that pasteurization, no matter how carefully handled by existing commercial techniques, can be readily detected in finished products. In order to accumulate objective data on this observation, samples were compared in which (a) neither concentrate nor cutback juice was pasteurized except to the extent the concentrate was heat treated during evaporation, (b) the concentrate was pasteurized before concentration and unpasteurized cutback juice was added as the diluent, and (c) both the raw juice for concentration and the raw juice for cutback were pasteurized prior to use. The data are shown in Fig. 8.

These data would seem to support the conclusion that the best product is made when no pasteurization is used and that pasteurization of the cutback juice is readily discernible initially, but appears to level off on storage. The low initial score for a completely pasteurized product represents a sufficient number of tests to have statistical significance and we believe is attributable to the recognizable cooked flavor. This cooked flavor mellows itself on storage, producing the apparent flavor improvement noted on the curve. It is believed that these data differ from those accumulated in the Florida Citrus Experiment Station where pasteurization was felt to have a less marked effect upon initial flavor than reported herein.

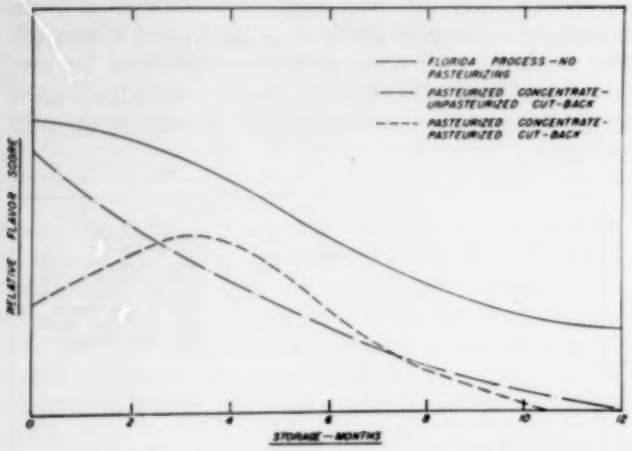

FIG. 8. Effect of pasteurization on initial flavor and storage characteristics of orange juice concentrate using Florida Valencias.

Orange Powder vs. Orange Concentrate

These basic process studies would not be complete without a word on the quality aspects of orange juice powder. A very intensive study of the initial quality and storage characteristics of low temperature (lyophilized) powders was made as the result of a process offered for sale to General Foods Corporation. Process details must remain confidential, but it can be pointed out that several hundred samples of sublimation dried orange powders were prepared by methods cited in the literature as well as by the method under consideration. These products were compared with fresh juice and commercial frozen concentrate. Average scores for the products were:

1. Fresh juice—8.4-8.8
2. Commercial Frozen Concentrate—7.3-7.6
3. Powdered Orange Juice Samples—5.7-6.3[*]
   Range—(4.9-7.6)

On the basis of these results it is difficult to see how powdered orange juice can offer the concentrates any serious competition with the present concept of the art.

Fundamental Investigations in Flavor Changes

Quite a few other variables have been studied than those reported on the above, but at the present time only inadequate data are available. Among the things covered were (1) the method of extraction of the juice as related to initial and storage characteristics, (2) the addition of pulp to the juice in varying levels, also in relation to initial and storage characteristics, (3) the study of Florida fruit varieties, and (4) the study of antioxidants and gas processing as a means of controlling off-flavors which develop on storage.

The results of these early tests, as well as more recent market experiences only served to emphasize the need for further intensive investigation into the causes of storage changes and means for delaying or inhibiting these changes. A comprehensive program on this problem was developed which is still being very actively pursued. Some of the factors being investigated and the results and conclusions to date are reported below:

Effect of Storage Temperature on Flavor Change

The effect of storage temperature on the rate of flavor change of single strength juice has been surveyed and it was noted, as might well be anticipated, that the higher the storage temperature, the more rapid the rate of change; an observation paralleling those reported already for canned commercial orange juice. A temperature of —40° F. was employed with the hope that at this point the rate would be so slow as to be negligible and samples so stored could serve as controls. This was not the case, since even at this low temperature the same typical changes take place, although much more slowly; namely, first the loss of freshness followed by the change of the characteristic orange aroma to a fruity aroma characterized as typical of apples, apricots, or strawberries, and finally the development of staleness.

Isolation of Component Part Responsible for Storage Change

In an attempt to throw light on the particular fraction or constituents of orange juice undergoing change on storage, a study was made of the more volatile fractions. The importance of volatile components in the finished product has already been demonstrated. If as little as one or two percent of the water is removed by flashing from room temperature into a vacuum there is a loss of sufficient volatiles to be damaging to fresh quality. More extensive evaporation progressively removes the volatile fraction and finally results in a product having no off flavors if heat damage is avoided but conspicuously lacking in freshness and characteristic orange aroma. Fig. 9 presents the data on single strength juice (100% volatiles) and concentrates having varying proportions of the volatile fraction added back to them as single strength cutback juice.

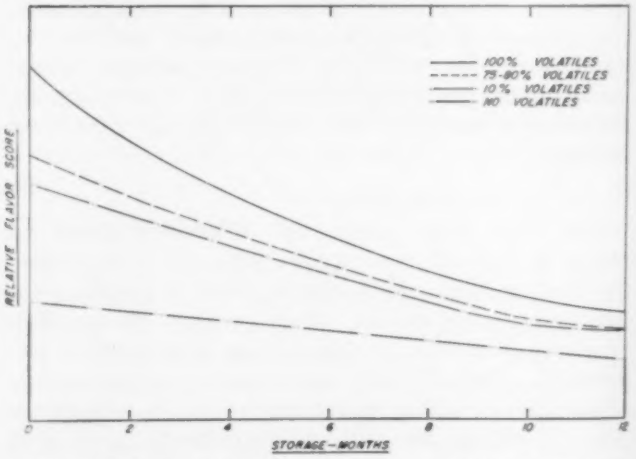

FIG. 9. Effect of increasing volatiles on initial quality and storage behavior of orange juice.

It is noted that the base concentrate stripped of volatiles had a relatively low rating when fresh and the product underwent comparatively little change during storage. Concentrates containing volatile fractions changed in storage roughly in proportion to their volatile content. These data have been confirmed by a study

[*] This score represents 0° F. storage. Powder stored at 70° F. was completely unacceptable in less than 30 days.

of the volatile fraction, collected from stored concentrate by distillation techniques. The characteristic flavors of the stored product could be distilled off and recovered in the condensate, leaving a relatively bland base concentrate with a low flavor rating. It would, therefore, appear that the storage changes previously noted are associated directly with the more volatile components. Insofar as present commercial processes are concerned, further investigations should be directed at the cutback juice rather than the concentrate.

Flavor Changes Induced by Microorganisms

Obviously, microorganisms can be responsible for off flavors in juice if it is grossly mishandled. Rotted fruit or fruit stored wet and held in this condition prior to extracting will result in high organism counts and the flavor of the concentrate will be scored downward accordingly. Pilot plant and factory observations have indicated that under conditions of good sanitary practice and continuous storage in a frozen state, orange concentrates will still contain a considerable number of organisms. The possible effect of these microorganisms directly or indirectly on flavor change during storage were investigated. Sound sterile oranges were introduced into a sterile chamber. The juice was expelled, screened, and packed under aseptic conditions. When carefully handled, single strength juice so packed with no chemical or heat treatment was found to be commercially sterile; i.e., it could be stored at room temperature without fermentation, and bacterial counts, if not zero, were in the range of 1 to 3 per milliliter. Storage characteristics of these sterile packs have been found to be essentially the same as commercial packs having microorganism counts of 50,000 to 100,000; normal for good, sanitary commercial scale frozen concentrate operations. These data are shown in Table 5.

TABLE 5

Effect of Microorganisms on Storage Characteristics of Untreated Frozen Single Strength Orange Juice

Plate Count Per Ml. When Freshly Frozen	Taste Scores	
	No Storage	6 Months Storage
237,000	6.2	5.9
None	5.6	5.0
45	6.3	6.1
5	7.1	5.0

It should not be concluded that microorganisms can be neglected in routine plant operation. These data would indicate that microorganisms normally present in the product when good commercial practice is followed have no deleterious influence on flavor or flavor changes. Storage changes normally observed must therefore be attributed to some other factor.

Changes Induced by Enzymatic Action

The role played by enzymes in the deterioration of orange juice in storage is probably twofold: (a) The pectinesterase activity is a factor in the separation or settling of commercial frozen concentrates; (b) Other enzymes are possibly responsible for some flavor changes. The literature indicates that orange juice contains at least peroxidase, pectinesterase, acetylesterase, phosphatose, cytochrome oxidase, and dehydrogenase.

The enzyme content of orange juice varies appreciably with the manner used to express and finish the juice. Pectinesterase is associated with the solid fraction of the juice; methods of expressing juice which macerate the non-juice portions of the orange have been shown to give high enzyme activities. Therefore, the type of juice extractor may be of importance. To support this, a comparison of commercial extractors was made in Florida this spring and work is continuing this season here in California. The possible commercial significance of this work in relation to the problem of separation of commercial juices must await the completion of storage tests.

The relationship of enzyme action to settling of the solids can be easily established by pasteurization. The possible role of enzymes in flavor changes is more diifficult to establish. If the sample is pasteurized sufficiently to give a negative test by the Stevens [4] method for pectinesterase, the flavor damage is extensive as measured by a critical evaluation. This is true even though the pasteurization is carried out at high temperatures with time cycles of heating, holding and cooling as low as 2 and 3 seconds. Other possible methods of enzyme inactivation, such as ultrasonic vibration, have been investigated but to date, under no conditions have the enzymes been inactivated without changing the fresh character of the juice. Conversely, to date no sample of juice with fresh juice flavor has been produced completely free of enzyme activity. Therefore, the possible detrimental effect of enzymes on the flavor components during frozen storage has not been eliminated.

Although it has not been possible to run a conclusive experiment by inactivating enzymes without flavor change, it has been possible to increase the rate of typical flavor change by the addition of enzyme concentrates. It was discovered that when one part of a glucose oxidase concentrate was added to 3000 parts of orange juice, the flavor was changed within one hour, while no detectable change took place in the control samples. The change in flavor induced by glucose oxidase is typical of the flavor change taking place over a period of 6 to 8 months in frozen storage, and is related to the amount of oxygen present in the juice, as illustrated in Table 6.

TABLE 6

Effect of Deoxygenase on Single Strength Orange Juice in Frozen Storage

Treatment	Deoxygenase Added	Flavor Score		
		Fresh	2 Hrs.	8 Mos.
Deaerated, Reamed Juice	None	7.3	7.3	5.0
Deaerated, Reamed Juice	1 Part/1,000	6.3	4.6	....
Undeaerated, Reamed Juice	1 Part/1,000	6.7	4.2	....

The stale flavor so produced can be readily distilled as can the normally staled aroma.

The addition of pectinesterase enzyme concentrates prepared from orange products had no effect on the

[4] Stevens, J. W. Method of Testing Fruit Juices. U. S. Patent 2,267,050, Dec. 23, 1941.

flavor changes under the experimental conditions investigated.

Possible Chemical (Non-Oxidative) Changes

The flavor constitutents of orange juice have been investigated. However, research in this area has been limited to the organic constituents in the volatile fractions. Although there is a possibility that flavor changes may originate in inter-reactions such as transesterification, or cleavage such as hydrolysis, this work has not progressed sufficiently to throw any light on these possibilities.

Oxidative Changes

Oxygen plays an important role in the development of stale flavor of orange juice in frozen storage. This oxidation could be enzymatic, or it may be non-enzymatic, or even both. The fact that oxygen is required for the change is shown in Table 7.

TABLE 7

Effect of Oxygen on Storage Characteristics of Frozen Orange Juice

Treatment	Oxygen	Taste Test Scores	
		Fresh	6 Months Storage
Extracted in Air, Air Packed	213 p.p.m.	7.4	4.2
Extracted in Nitrogen Deaerated with Nitrogen, Reaerated	6 p.p.m.	7.1	5.0
Extracted in Nitrogen, Deaerated with Nitrogen	0.5 p.p.m.	7.4	6.7

The fact that oxygen plays such an important role in this flavor change does not minimize the possible action of oxidative enzymes; on the contrary, it may emphasize the role played by the enzymes.

The fact that commercial packers have reported little or no difference between air pack and vacuum packs cannot be taken to indicate that oxygen is unimportant in storage changes. If the juice is exposed to air throughout the course of the present commercial operation and contains incorporated air when packed, there will be little or no advantage in so-called vacuum packing at 10 to 15 inches of vacuum. The amount of exposure to atmospheric oxygen and/or the amount of air sealed in the can is amply sufficient to complete the oxidation of the delicate flavor constituents present in even the best oranges.

Fig. 10 indicates the amount of air that can originate in the various commercial process stages. Current research is showing that the critical oxygen level necessary to effect deterioration of flavor is very low and that

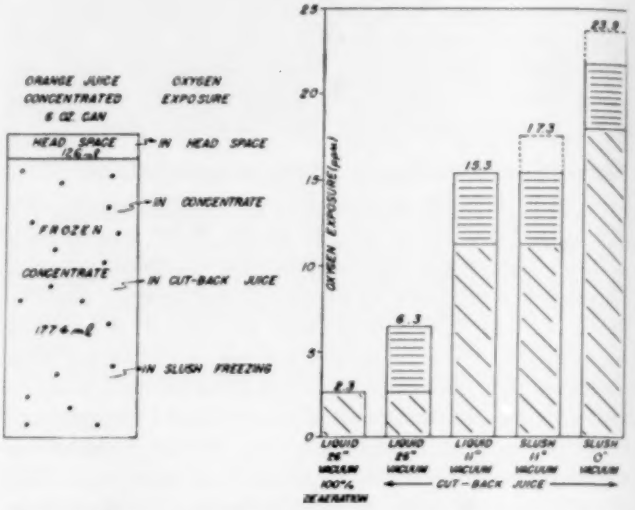

FIG. 10. Oxygen exposure of canned orange juice concentrate.

research data and recommendations on oxidative deterioration reported years ago for canned heat processed single strength orange juice may be equally applicable to the frozen concentrate industry.

Acknowledgment

The experimental program presented herewith has been a major effort of the Food Technology area, Central Laboratories, General Foods Corporation, Hoboken, New Jersey. Supporting data have also been contributed by the Bireley Laboratories, Bireley's Division, General Foods Corporation, Hollywood, California, and by the Birds Eye-Snider Research Laboratories, Birds Eye-Snider Division, General Foods Corporation, Albion, New York. The number of individuals personally contributing is too large for recognition here, but grateful acknowledgment is extended by the authors to all who have participated from the three areas mentioned above.

Sirup Treatment of Apple Slices for Freezing Preservation[a]

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Western Regional Research Laboratory,[b] Albany, Calif.

Vacuum impregnation of apple slices with sugar sirups has been studied and the product of this pre-freezing treatment has been compared with that from steam blanching and from sulfiting. Generally, the product of sirup filling was equal or superior to that of steam blanching and sulfiting, but most improvement over these processes was noted in the softer varieties.

Introduction

The common methods for pretreating apple slices for freezing preservation are principally designed for the prevention of browning after freezing and thawing. Although several methods are available, including the use of ascorbic acid *(1)*, the usual commercial treatments involve steam blanching of the slices at 210° to 212° F. for sufficient length of time to prevent browning, or dipping in solutions of sulfur dioxide or its derivatives *(2, 6, 7, 8, 10)*.

However, the use of either steam blanching or of

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, California, July 12, 1949.

[b] Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

sulfur dioxide is subject to criticism. Although steam-blanched slices usually have good color, it has been shown *(5)* that the heat treatment required causes large losses in soluble solids. In addition, it is known that blanching causes excessive softening (especially in the softer varieties) and flavor changes. The sulfur dioxide treatment produces a satisfactory product in respect to color, but generally the amounts necessary for satisfactory color retention during freezing and subsequent thawing cause an after-taste which is objectionable to some people. The treatment to be described has been devised to prevent the browning of apple slices after freezing and thawing; at the same time it produces a product with more desirable flavor, texture, and drip characteristics than that resulting from the usual procedures. This treatment called "sirup filling" consists of removal of tissue gases from the slices by the use of a vacuum, followed by partial replacement of voids with sugar sirup containing a small amount of antioxidant.

Grab and Haynes *(3)* have recently described a method involving pretreatment of apple slices in a vacuum with a sucrose sirup containing a small quantity of ascorbic acid. Although this method is very similar to sirup-filling, the following report on the treatment as applied to western apples includes additional quantitative data. Vacuum treatment of sliced apples is included in certain patented processes.

The investigations carried out in the development of the sirup-filling treatment can be conveniently divided into two distinct phases: First, a study has been made of the mechanics of the treatment, including changes in weight and in soluble solids of the apple slices and of the sirup. Second, organoleptic appraisal of the product has been carried out by comparing it with corresponding products resulting from usual steam blanching and sulfiting procedures.

Mechanics of Sirup Filling

Procedure: Delicious, Gravenstein, Pippin, and McIntosh varieties were used in most of the work. The apples (from 33° F. storage) were mechanically peeled, cored, and sliced (twelfths) directly into 1 percent NaCl solution, where they were held 3 to 5 minutes. The slices were then drained in a stainless-steel wire basket for 2 minutes, weighed, and completely submerged in an equal part by weight of sirup containing an antioxidant and then subjected to a vacuum of 29 inches of mercury for 2 to 3 minutes. The vacuum was broken with air and the fruit was held undisturbed for a short period to permit penetration of sirup into the slices. Next, the slices were removed from the sirup and drained for 1 or 2 minutes until relatively free from excess sirup. The drained slices were then packaged in sanitary-type tinned cans, sealed, frozen, and stored at —10° F.

The soluble solids in the sirups and apples were determined by refractometer both before and after treatment. Three hundred gram samples of apples were homogenized in a blender for about 5 minutes in preparation for the determinations.

As vacuum is applied to a sirup solution in which apple slices are submerged, air begins to leave the tissue when the vacuum gauge reads approximately 10 inches and bubbling steadily increases up to 29 inches, at which point most of the air is removed in 2 to 3 minutes. A vacuum of 25 inches may be sufficient for fully ripe, soft varieties. When the vacuum is released, the sirup solution tends to fill the spaces or voids previously occupied by the gases to an extent dependent on the nature of the solution, the physical characteristics of the apple, and the "residence time" of the slices in the sirup.

TABLE 1

Weight Changes Resulting from Vacuum Impregnation of Sliced Apples with Sucrose Sirups [a]

Variety	Season	Initial percentage sucrose in solution	Percentage increase
Delicious	1946	0	27
Delicious	1946	20	16
Delicious	1946	40	7
Delicious	1946	60	5
Delicious	1946	20	13
Delicious	1946	40	4
Delicious	1946	60	4
Delicious	1948	20	12
Delicious	1948	30	8
Delicious	1948	40	9
Delicious	1948	60	9
Pippin	1948	20	10
Pippin	1948	30	10
Pippin	1948	40	4
Pippin	1948	60	7

[a] Sample weights ranged from 3.8 to 7.5 pounds of apple slices per batch.

The effect of the nature of the solution is illustrated in Table 1, where it is seen that the greatest percentage of weight gain occurs with water. As the sucrose content of the impregnating solution is increased, the percentage weight gain of the slices tends to decrease. This progressive variation (which becomes negligible at the higher sucrose concentrations) is presumably the result of variations in (a) penetration of liquid and in (b) osmotic effects. Although the samples treated with 20 percent sirup showed greater weight increases, the slices impregnated with 40 to 60 percent sirup gained two to three times as much in soluble solids. Generally the soluble solids of slices treated with the heavier sirups were approximately doubled. On cross-sectioning, water-filled slices usually are translucent throughout, showing complete penetration of the liquid, whereas sirup-filled slices are generally opaque except for a narrow band around the surface. A relatively greater loss of water from the slices to the more concentrated sirup solutions due to osmosis might also be expected.

TABLE 2

Weight Changes Resulting from Vacuum Impregnation with 50 Percent Sucrose Sirup [a]

Variety	Percentage increase
Cortland	2.5
McIntosh	4.2
Golden Delicious	5.7
Gravenstein	6.5
Rome Beauty	7.3
Common Delicious	7.5
Red Delicious	7.6
Pippin	7.7
Winesap	12.2
Jonathan	12.3

[a] Sample weights ranged from 10 to 25 pounds per batch.

The effect of variety of apples is illustrated in Table 2. Although seasonal, geographical, and cultural conditions may profoundly affect these results, Table 2 indicates that variety is one of the most important factors influencing weight pick-up from sugar solutions. Within a given variety, it has been found that the use of riper, softer fruit results in a greater weight pick-up and easier penetration, but soft varieties such as Cortland and McIntosh picked up much less weight than well-known hard varieties such as Winesap and Newtown Pippin. Hence the easily discernible textural differences encountered among varieties cannot be relied on to indicate the relative weight changes associated with the process. The results are probably due to the uniqueness of the structural makeup of each variety.

The effects of "residence time" depend upon variety and maturity. For varieties whose structure permits only minor sirup absorption, the predominating effect will be a weight loss, apparently due to osmosis, and this weight loss will increase with increasing time of submersion (Table 3). On the other hand, varieties

TABLE 3

Effect of "Residence Time" on Weight Changes of Hard, Immature Gravenstein Apples [a]

Residence time	Initial sucrose in sirup	Percentage loss
	%	
20 minutes	60	3.4
60 minutes	60	6.8
60 minutes	60	5.4

[a] Sample weights ranged from 5.7 to 6.4 pounds per batch.

which absorb relatively large quantities of sirup will show a weight gain, even after long exposure times (Figures 1 and 2). Apparently in this case penetration of sirup slowly increases with increasing "residence time" modified to varying degrees by increasing viscosity of sirup and by increasing rates of water removal due to osmosis.

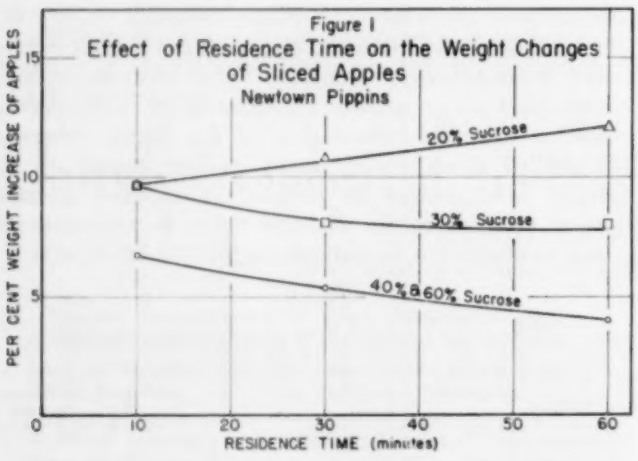
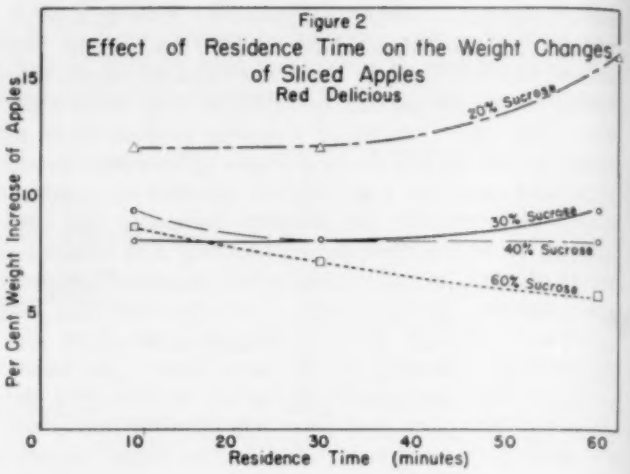


Figure 1
Effect of Residence Time on the Weight Changes of Sliced Apples
Newtown Pippins
20% Sucrose
30% Sucrose
40% & 60% Sucrose
PER CENT WEIGHT INCREASE OF APPLES
RESIDENCE TIME (minutes)

Changes in the sirup depend, of course, upon the ratio of sirup to apple slices. In order to insure complete coverage of the slices, approximately one part by weight of sirup is used for each part of fruit. Under these conditions, the most pronounced change in the sirup is a lowering in density, the decrease being dependent on



the "residence time" of the apple slices (Figure 3). The greatest change in density of sirup always takes place shortly after the fruit and the sirup are mixed; further decreases become smaller and smaller with increasing time. Thus, it appears that the first dilution is due to surface moisture and that subsequent dilution is a result of osmotic action.

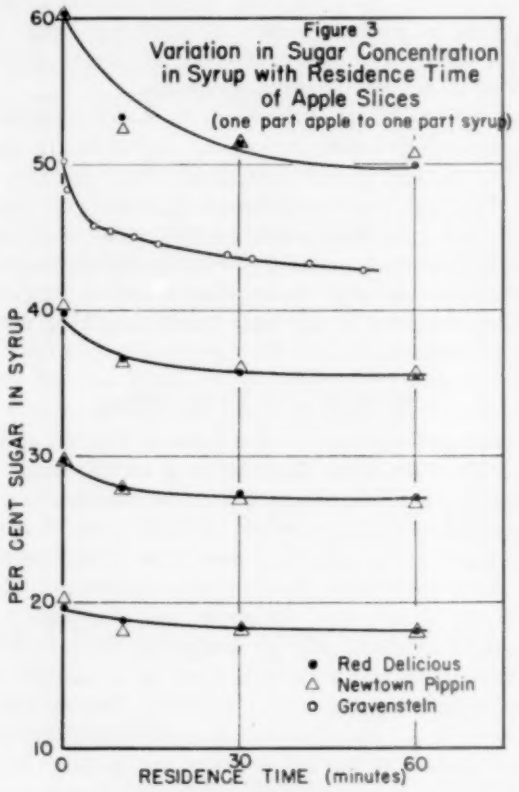


Figure 3
Variation in Sugar Concentration in Syrup with Residence Time of Apple Slices
(one part apple to one part syrup)
PER CENT SUGAR IN SYRUP
RESIDENCE TIME (minutes)
Red Delicious
Newtown Pippin
Gravenstein

Another important change is a decrease or increase in volume of the sirup. Since most of the varieties tested absorbed an appreciable amount of sirup during the process, a reduction in volume generally resulted. In those cases where little absorption took place, sirup volume usually increased.

During the evacuation of certain varieties, considerable frothing above the liquid level of sirup occurred, materially reducing the capacity of the containing vessel. In order to overcome this difficulty, the slices

can be evacuated in the absence of sirup and the vacuum broken with sirup. This procedure not only eliminates frothing, but also facilitates removal of air from the slices and reduces contact time between apples and sirup *(1)*. The later factor may be important in varieties that tend to lose weight in heavy sirups *(3)*.

Both ascorbic acid (0.2 to 0.3 percent in conjunction with 0.2 to 0.3 percent NaCl or 0.5 to 1.0 percent citric acid) and sodium bisulfite (200 to 300 p.p.m. SO_2) have been used satisfactorily as antioxidants added to the sirups. The main reason for reduction in the amount of SO_2 needed when the sirup filling process is used is the fact that much of the oxygen is removed from the apple tissue and thus, interior discoloration is no longer a problem. Moreover, the removal of air greatly speeds up the penetration of antioxidant.

Continuous Sirup Filling: Since sirup filling is essentially a batch treatment it is subject to the limitations and disadvantages inherent in such operations. Consequently it was decided to investigate the possibility of a continuous procedure. The sliced apples were dipped in sirup containing antioxidant, drained, packed in sanitary-type tinned cans, and sealed under a vacuum of 29 inches of mercury prior to freezing. This procedure accomplishes the main purpose of sirup filling, namely the removal of gases from the apple tissue. When the slices are allowed to thaw under vacuum, the voids are apparently sealed up by the melting sirup, aided by partial collapse of the evacuated tissue. Discoloration has not been observed in a period as long as 24 hours after defrosting, even if no antioxidant is added, provided the can is not opened during this time. In order to prevent surface browning after opening and during baking in pies, however, small amounts of ascorbic acid (0.1 to 0.2 percent) or sulfur dioxide (100 to 200 p.p.m. as $NaHSO_3$) in the dipping solution is necessary.

If the container leaks or is opened prior to defrosting, oxygen will reenter the tissue and rapid browning will occur throughout the interior of the slices during thawing. Hence the success of this procedure is entirely dependent upon the ability to maintain a vacuum in the container throughout the storage period.

The film of sirup acquired during the dipping step increases the weight of the apples up to 3 percent and raises the soluble solids of the fruit by 3.5 to 5.5 percent.

Comparison of the Products from Sirup-Filling with Those from Sulfiting and Steam Blanching

Procedure: Slices from several varieties of apples were treated by the batch sirup-filling treatment and compared with corresponding slices prepared by (a) the continuous sirup-filling procedure, consisting of dipping 5 minutes in 50 to 60 percent sucrose sirup containing 0.2 to 0.3 percent ascorbic acid, followed by draining, packaging, and sealing under a vacuum of 29 inches of mercury, (b) sulfiting by dipping 2 minutes in a solution of 0.2 to 0.25 percent SO_2(added as $NaHSO_3$ and adjusted to pH 3.0 with citric acid), and (c) steam blanching 5 minutes at 210 to 212° F. followed by fog-air cooling for 3 minutes. In all treatments, the drained slices were packaged in sanitary-type tinned cans, sealed, frozen, and stored at —10° F. before evaluation. After thawing under standardized conditions, the slices were baked in pies at 475° F. and appraised by a panel of trained judges.

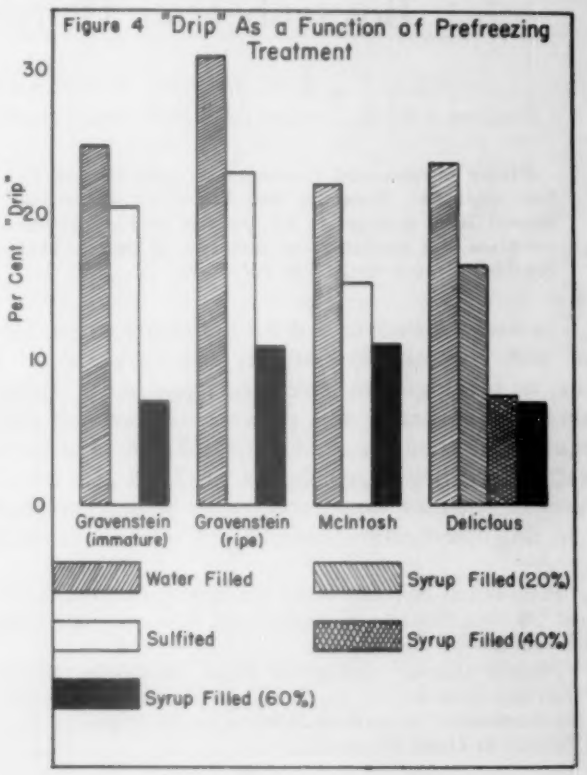
The amount of drip or leakage was determined by weighing the juices collected from thawed slices after a 5-minute draining period on an 8-mesh screen. The slices were defrosted for 3½ hours under running tap water in their original sealed containers.

Results of Comparison: The greatest overall improvement due to sirup-filling was observed in soft varieties such as Gravenstein, McIntosh, Cortland, and Rome Beauty. The baked fruit from sulfited or blanched slices prepared from these varieties was essentially a mushy sauce lacking in flavor, whereas the sirup-filled slices, though soft, retained their normal shape and appearance as well as most of their natural fresh flavor. As might be expected, slices treated with 40 to 60 percent sirup had a firmer texture and better appearance than those which were impregnated with 20 percent sirup.

In the case of Winesaps and Pippins, the texture of slices prepared by sirup filling was not appreciably improved over that resulting from steam blanching or sulfiting; neither of these latter two processes seems to weaken seriously the structure of hard apples. However, for all varieties tested, the flavor of the sirup-filled samples was eminently superior to comparable slices blanched in steam.

Sirup filling also prevented the vigorous frothing and boiling over, which frequently occurs during the baking in pies of sulfited slices of the soft varieties, presumably because of the removal of a large proportion of the tissue gases from the slices during the vacuum process.

The data in Figure 4 clearly demonstrate the superiority of the sirup-filling procedure over other



treatments in prevention of excessive drip or leakage of juice during thawing. Since there is little, if any, replacement of added liquid for gases in the continuous sirup-filling treatment, the drip during defrosting is somewhat less than for the batch procedure.

The flavor, texture, and color of fruit prepared by the continuous sirup-filling treatment were in every way equal or superior to those of comparable fruit prepared by batch treatment.

The final acidity of sirup-filled fruit may be adjusted to any desired value by incorporation of the proper amount of fruit acid in the impregnating sirup. The flavor of Delicious apples was greatly improved by raising the total acidity to approximately 0.4 percent. If desired, additional firmness may be obtained, depending on maturity and storage history, by adding small amounts of calcium salts to the impregnating solution *(4, 9)*. Requirements of the appropriate regulatory agencies must, of course, be met if acid or calcium is added to the product.

Conclusions

Sirup-filling treatment applied to apple slices (either batch or continuous) yields a product with a flavor superior to that resulting from steam blanching or sulfiting; texture of the softer varieties is also greatly improved.

The most satisfactory product results from the use of sugar solutions in the range of 40 to 60 percent sucrose.

With 40 to 60 percent sirup, the resulting drip is considerably less than that resulting from the sulfiting and the steam-blanching treatments.

Acknowledgments

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The Ascorbic Acid and Carotene Content of Frozen Peaches and Boysenberries Defrosted with Dielectric Heat[a]

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Frozen peaches and boysenberries were thawed by four methods. Dielectric and hot water defrosting showed least destruction of ascorbic acid. Carotene retention was similar in all methods. Dielectric heat provides a rapid method of defrosting.

The use of dielectric heat for defrosting frozen foods has been proposed by Cathcart and Parker *(3)*. To date, no investigations have been reported on the vitamin retention during this process. However, it might be assumed from the studies on the use of dielectric heat for scalding vegetables *(4, 6, 7, 8)* that smaller losses of vitamins would occur than in other methods.

In this investigation, comparisons were made on the ascorbic acid and carotene content of frozen peaches and boysenberries defrosted by dielectric heat and by conventional methods.

Experimental Procedure

Defrosting Methods: The Mann-Russell generator[c] used for dielectric defrosting had a frequency range of approximately 20 to 30 megacycles. The maximum grid rating was 200 milliamperes and the maximum plate working rating 0.7 ampere. The rated power input was 5 to 15 KVA with an output between 5,000 to 15,000 B. T. U. per hour. The generator was connected by 70 inch copper leads to 5 x 6 inch aluminum electrodes in open air. A plate current of 0.3 ampere was used in this study. The air space was ¼ inch and an electric fan was used for air circulation. Further mechanical and electrical details may be found in a publication by Ross *(10)*.

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[b] Present address: College of Home Economics, Syracuse University, Syracuse, N. Y. This paper represents a portion of a thesis submitted in partial fulfillment for the degree of Master of Science in Home Economics.

[c] Manufactured by Northwest Syndicate, Inc., Tacoma, Washington.

The other methods of defrosting included room temperature, 70° F. (21° C.), refrigerator temperature, 36° F. (2° C.) and hot water, 130° F. (54° C.).

One-pound packages of commercially frozen peaches and boysenberries were used. For dielectric defrosting, the frozen fruit was removed from the cellophane bag and placed in a round pyrex dish (6¾" x 1½") between the two electrodes. It was necessary to remove the fruit from the package to eliminate arcing. Localized overheating was also avoided by this arrangement since the more conductive liquid portion melted away from the top electrode and flowed out of the intense electric field. For the other methods the fruit was defrosted in the original cellophane bag. Defrosting was considered complete when the fruit reached a temperature of 40-50° F. (4-10° C.). This required 3 minutes for dielectric defrosting, 4 hours at room temperature, 16 hours at refrigerator temperature and 20 minutes in hot water.

Analytical Procedure: The original ascorbic acid content of the frozen fruit was determined after blending the entire package of fruit as described by Rubin, Jahns and Bauernfeind *(11)*.

Immediately after defrosting, replicate samples, composed of representative mixtures of drained fruit and sirup, were analyzed for ascorbic acid and carotene. With peaches, the reduced ascorbic acid was determined by the Loeffler and Ponting *(5)* method, the dehydroascorbic and total ascorbic acid by the Bolin and Book *(2)* modification of the Roe and Oesterling *(9)* method. Dehydroascorbic acid determinations on peaches made by the Bessey *(1)* and Bolin and Book *(2)* methods gave similar results. For boysenberries, the photocolorimetric procedure described by Rubin, Jahns and Bauernfeind *(11)* was employed.

The Wall and Kelley *(12)* procedure was used for the carotene determinations. Total carotenoids were determined directly on the petroleum solvent (bp. 63-70° C.) extract.

The data were statistically treated by the analysis of variance.

Results

ASCORBIC ACID

The results of the ascorbic acid determinations are summarized in Table 1.

Peaches: Under the conditions of this experiment, the reduced and total ascorbic acid contents of peaches defrosted at room and refrigerator temperatures were significantly lower than those of the fruit defrosted with dielectric heat or hot water. The dehydroascorbic acid content tended to show a similar trend. The total ascorbic acid values for peaches defrosted with dielectric heat and hot water were similar. However, a significantly greater amount of the ascorbic acid was retained as reduced ascorbic acid in the peaches defrosted by hot water than in the peaches dielectrically defrosted.

There was a significant loss of reduced and total ascorbic acid in all methods of defrosting.

TABLE 1

Ascorbic Acid Content in Frozen and Defrosted Peaches and Boysenberries

Fruit	Ascorbic Acid	Number of Samples	Frozen	Defrosted				L. S.	D[1]
				Dielectric	Hot Water	Room Temperature	Refrigerator Temperature	5%	1%
			mg./100 gm.	*mg./100 gm.*	*mg./100 gm.*	*mg./100 gm.*	*mg./100 gm.*		
Peaches	Reduced	12	Mean 26.8 Range 26.3-27.2	18.3 14.6-23.5	22.0 18.5-24.8	17.3 14.3-22.5	17.0 14.2-20.1	0.8	1.0
	Dehydro	12	Mean 15.2 Range 12.4-18.6	18.5 15.2-24.2	16.0 14.1-17.9	14.7 12.0-18.1	15.5 11.6-19.1	0.8	1.1
	Total	12	Mean 38.4 Range 35.8-41.4	33.1 29.5-36.6	32.2 30.6-36.0	27.5 25.0-29.7	27.5 23.0-30.7	1.2	1.6
Boysenberries	Reduced	36	Mean 10.2 Range 8.2-11.7	18.0 10.9-25.7	20.2 8.7-33.2	19.0 12.5-28.1	17.3 7.4-29.4	2.7	NS[2]
	Dehydro	8	Mean 3.6 Range 2.6-4.3	11.2 9.4-13.3	10.3 7.8-11.9	8.7 6.3-12.2	10.0 6.2-12.5	NS[2]	NS[2]
	Total	8	Mean 13.8 Range 11.8-15.0	25.6 23.4-27.3	29.7 26.9-32.0	23.4 19.9-28.2	23.0 13.9-27.5	1.8	2.4

[1] Least difference required for significance between means.
[2] F value from variance analysis non-significant.

TABLE 2

Carotene and Total Carotenoid Content in Defrosted Peaches and Boysenberries

Fruit		Number of Samples	Defrosted[1]			
			Dielectric	Hot Water	Room Temperature	Refrigerator Temperature
			mg./100 gm.	*mg./100 gm.*	*mg./100 gm.*	*mg./100 gm.*
Peaches	Carotene	12	Mean 1.27 Range 1.12-1.52	1.39 0.93-1.82	1.42 0.98-1.67	1.42 1.20-1.82
	Total Carotenoids	12	Mean 1.57 Range 1.34-1.82	1.77 1.21-2.17	1.60 1.05-1.92	1.62 1.45-2.00
Boysenberries	Carotene	12	Mean 0.08 Range 0.05-0.11	0.09 0.05-0.16	0.10 0.03-0.20	0.07 0.04-0.10
	Total Carotenoids	12	Mean 0.27 Range 0.20-0.36	0.23 0.17-0.32	0.24 0.20-0.29	0.26 0.20-0.31

[1] F values from variance analysis showed no significant differences between means.

Boysenberries: The reduced ascorbic acid content of thawed boysenberries varied greatly from package to package as is evidenced by the wide range in values obtained (Table 1). No marked differences in reduced ascorbic acid content were found between the methods of defrosting. The hot water thawed boysenberries showed a significantly higher amount of total ascorbic acid than did the boysenberries defrosted by the other methods.

The ascorbic acid content of the samples blended without previous thawing was significantly lower than in any of the thawed material.

CAROTENE

The carotene and total carotenoid contents of both peaches and boysenberries were not affected by the method of defrosting (Table 2).

Conclusions

Dielectric heat provided a rapid method for defrosting frozen peaches and boysenberries. However, the retention of ascorbic acid and carotene in the dielectric defrosted was no higher than in the hot water thawed fruits.

Acknowledgment

The advice and assistance of Dr. Edward Ross in the operation of the high frequency generator is gratefully acknowledged. Acknowledgment is also made of the facilities and services of the Engineering Experiment Station through which the use of the high frequency generator was made possible.

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Performance Tests on Refrigerator Cars[a]

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The present day refrigerator car which has built-in fans, 3½ to 4 inches of insulation, and bunkers that hold 11,000 pounds of ice, will maintain temperatures of 40° F. or less in transit under usual refrigeration service and 10 to 15° if the ice is salted heavily (30% of ice supply). When used under heater service portable heaters are installed in the bunkers to protect perishables from sub-zero weather. During cool weather, the car is often used as a ventilator without bunker ice.

Many tests have been made of the performance of refrigerator cars operating under the services for which they are used in transporting perishables. The Transportation and Storage Project of the U. S. Department of Agriculture has been concerned with refrigerator car testing over a period of about 40 years and several hundred accompanied tests have been made. In addition to our regular tests, we have participated in cooperative work with the Association of American Railroads on refrigerator car design, the 29th of these tests having been made last summer with peaches from South Carolina to New York. Performance tests have covered a wide variety of fruits and vegetables, many types of services, and great extremes in outdoor temperatures. Cars available for general service have been used for the most part, but new types of cars and equipment are tested as they are developed. We have tried to select for this discussion tests that represent what can be done in common service with the equipment generally available.

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, California, July 12, 1949.

Precooling Service

Precooling fruits and many vegetables prior to shipment has become a general practice in many shipping areas because of the great benefit derived in retarding ripening and decay. Cold storage or precooling rooms are not always available at the shipping point, and because of this the refrigerator car has been used as a pre-

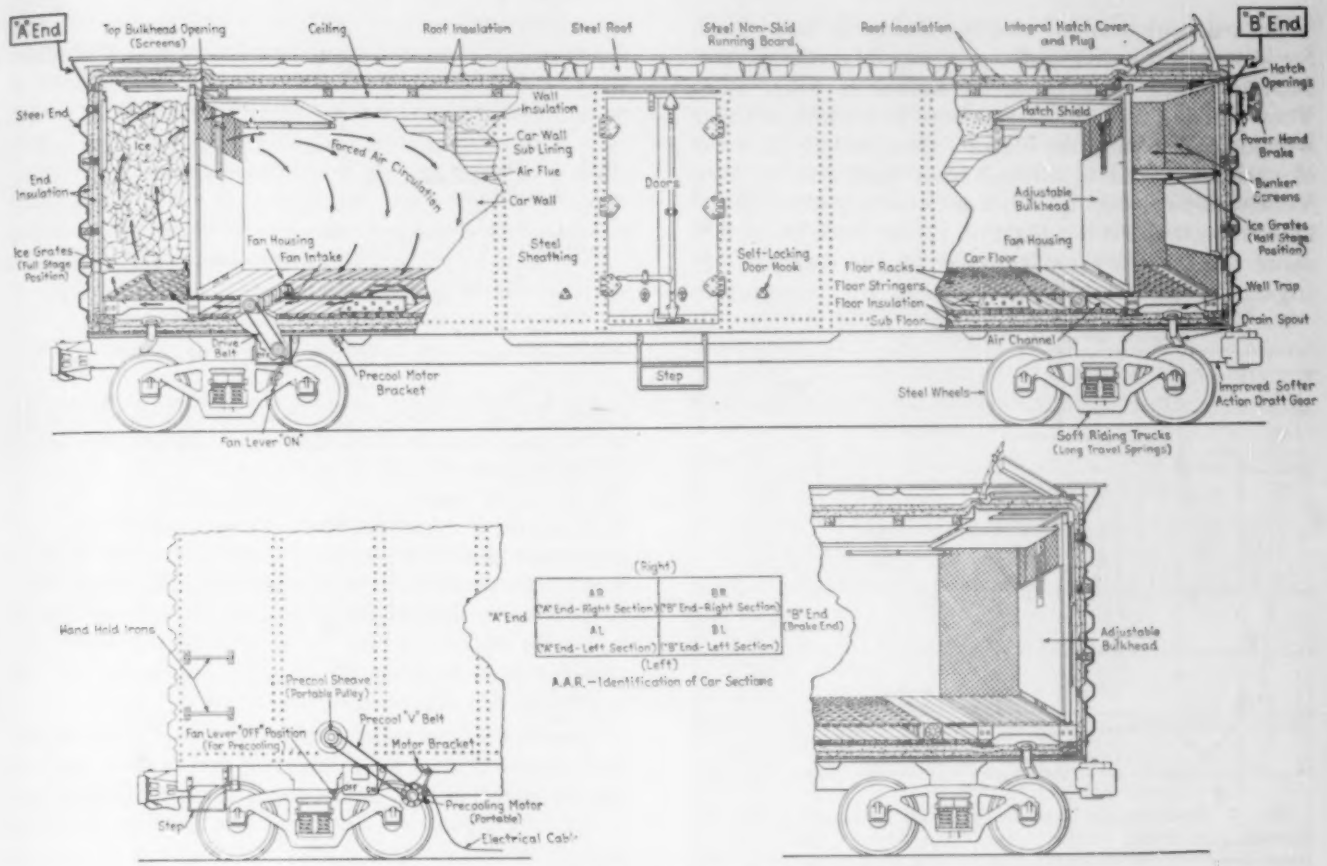

FIG. 1. Sectional drawing showing construction of modern refrigerator car.

cooling plant. The modern fan car has all of the equipment built in it that is needed for a precooling job (Figure 1). Two 1½ h.p. electric motors can be attached to the drive shafts for operating the fans when the car is standing; and if electric power is not avalaible, gasoline motors can be used instead. Figure 2 shows a precooling record made with a Preco fan car. Figure 3 shows a similar precooling test made with portable fans installed in a non-fan car. In both cases approximately 30 degrees of heat were removed from the fruit in 27½ hours. The refrigeration delivered by iced bunkers in some of our precooling tests has been at an exceedingly

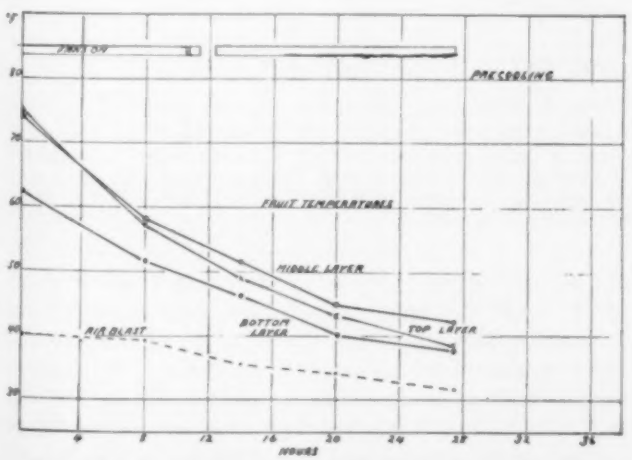

FIG. 2. Rate of precooling obtained in refrigerator car by operating built-in car fans. Heavy load of grapes (34,000 pounds).

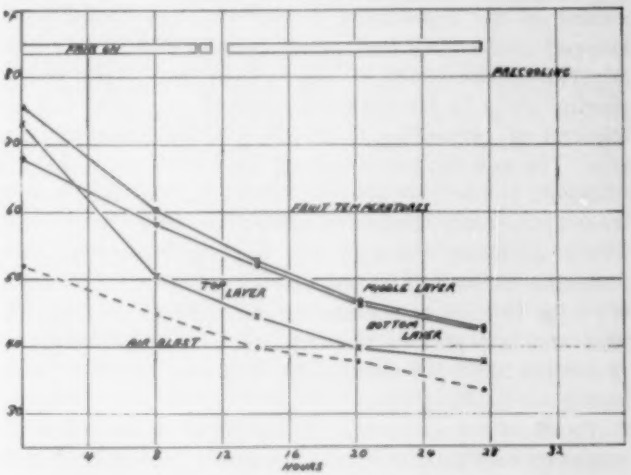

FIG. 3. Rate of precooling obtained in non-fan car of grapes with portable fans. Heavy load of grapes (34,000 pounds).

high rate, equivalent to 1½ tons per hour for short periods when the loads were hot, and ½ ton per hour average for 6 to 8 hours.

Refrigeration in Transit by Bunker Icing

Modified icing. A great number of refrigeration services are available for the protection of the lading from heat while in transit during warm weather. The most common practice is to use one of the bunker icing services, and the shipper may elect to have the cars pre-iced and re-iced at every icing station, these stations being about a day's journey apart. This is called

"standard refrigeration" and the charge is based upon the distance traveled and the commodity transported. Modified icing services are available at lower cost. They provide 1, 2, or 3 re-icings in transit, with or without replenishing the bunkers after loading. If a car of deciduous fruit is shipped from California to New York with two re-icings in transit after replenishing the bunkers at the first icing station (Rule 254), the cost is about $33.00 less than it would be for standard refrigeration service. Figure 4 shows the temperature

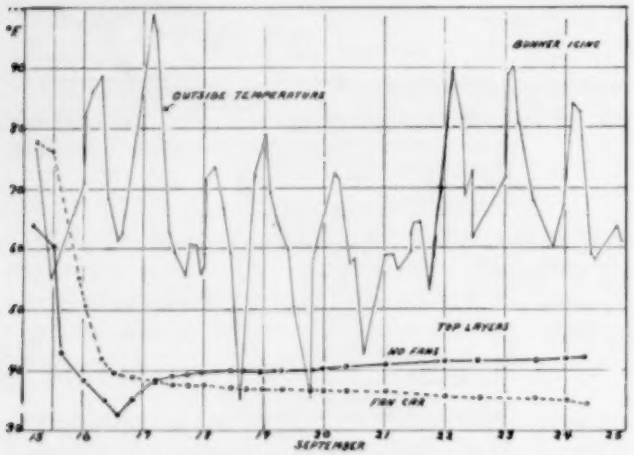

FIG. 4. Performance of precooled loads of grapes in fan and non-fan cars under bunker icing from Fresno, California, to New York, N. Y. Bunkers replenished after precooling. Re-iced at Ogden, September 19 and Chicago, September 23.

record in the top layers in two well pre-cooled cars shipped under this refrigeration rule *(8)*. Note the superior performance of the fan car which showed a gradual drop in temperature from 40° F. (4.4° C.) at the end of precooling to 35° F. (1.7° C.) during the trip. The non-fan car could not keep the fruit at 33° F. (0.56° C.), the temperature to which the top layers were precooled, and a temperature rise to 42° F. (5.6° C.) duing the trip was experienced. The performance of both cars was considered good in view of the high outside temperatures encountered during the first and last part of the trip. The records show the protection afforded the lading in warm weather by a well iced, insulated car.

Standard refrigeration. A temperature record of a non-precooled load in a non-fan car in transit is shown in Figure 5. Note the typical wide spread in temperature between top and bottom layers. This illustrates the inadequacy of natural convection as a means of air circulation. Slow cooling of top layers is another weakness of this system which relies upon a temperature difference, top to bottom of the car, for air movement. Three to four days are usually needed to bring top layers to 50° F. (10° C.) if the lading is moderately warm when loaded. Precooling was the remedy for this and it made possible a single re-icing in transit instead of daily re-icings. The savings amounted to $52.00, less a $20 to $25 cost for precooling.

Bottom layers of fruit are well refrigerated in non-fan cars because that is where the cold air from the bunker is expended. As might be expected, fan cars

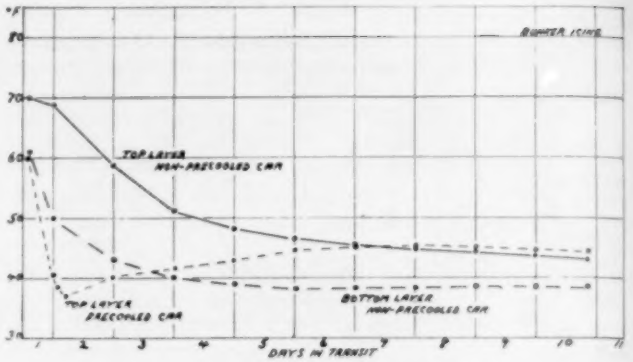

FIG. 5. Performance of non-fan cars with non-precooled and precooled loads of grapes from Fresno, Calif., to New York, N. Y. Bunkers re-iced daily in non-precooled shipment and on 5th day only in precooled car.

have not been a substitute for precooling, because car movement is not continuous enough during the first 24 hours after loading to provide sustained air circulation *(1)*. A more dependable practice is to operate the car fans with electric motors at the loading point until the load is cooled to about 40° F. (4.4° C.) before the car is released for shipment.

Standard refrigeration, salt, fan cars. Some perishable commodities, such as cherries and berries, need all the refrigeration that can be given them without danger of freezing. Fan cars and judicious salting of the ice provide a means of doing this *(6)*. Figure 6 is a record

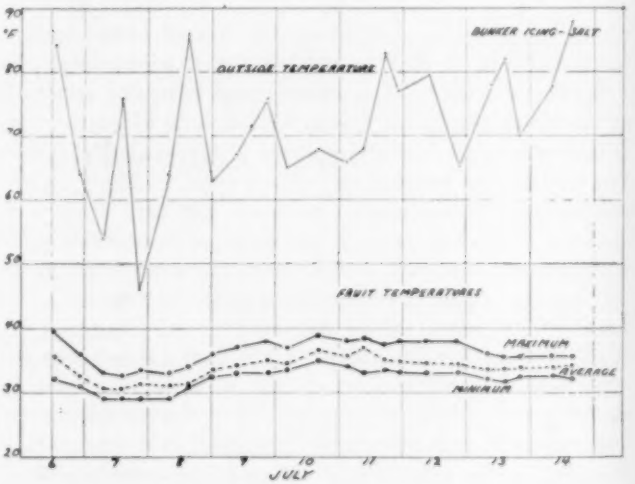

FIG. 6. Performance of fan car under ice and salting service. Precooled cherries shipped from Wenatchee, Wash., to New York, N. Y., with bunkers initially iced and re-iced daily; salted in amounts equaling 3 percent of the ice supplied initially and at all re-icings. Gerhardt and Ryall, U. S. D. A.-H. T. & S. Rept. 173 WFE 66568—1946.

of a carload of cherries precooled to an average of about 35° F. (1.7° C.) and then shipped under standard refrigeration with salt added to the ice in amounts equaling 3 percent of the ice supplied for initial icing and re-icing. Note that minimum temperatures were about 28.5° F. (—2° C.) for the first and second day after loading due to the heavy salting (288 lbs.) given the ice after loading on July 6. The average fruit temperatures were held between 31 and 37° F. (—0.56 and +2.8° C.)

and were about 35° F. (1.7° C.) for most of the trip; these were considered very good.

Similar low temperatures of 35 to 38° F. (1.7 to 3.3° C.) were maintained in 4 experimental cars of prepackaged vegetables shipped from California to midwestern and eastern markets in September *(12)*. Precooling, use of fan cars, and applying a small amount of salt to the ice at one or two icing stations were the means employed to accomplish this.

Body Icing

Body icing is the general practice for such perishable vegetables as lettuce, carrots, broccoli, cauliflower, sweet corn, and spinach. This term refers to the blowing of crushed ice over the top of the load and in the channels between the crates. Before ice-crushers and slingers were developed for this purpose, blocks of ice were placed on top of the load and in recesses or "pigeon holes" left in the load. Crushed ice is also used in the packages of someof the top-iced vegetables, such as lettuce, carrots, and broccoli. Figure 7 shows the

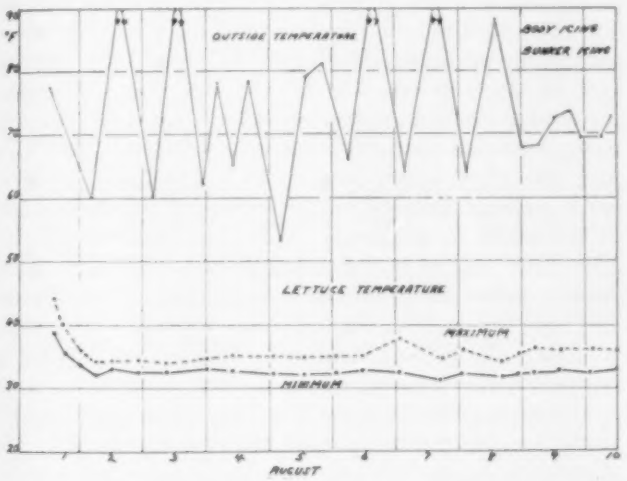

FIG. 7. Performance of refrigerator car under body icing. Lettuce shipped from Salinas, Calif., to New York, N. Y., package iced, body iced with 20,000 pounds, bunkers initially iced only. (Barger et al. A. A. R.-U. S. D. A. Rept. Test 18, Car A-1947.)

temperatures obtained in a carload of body-iced lettuce shipped from Salinas, California, to New York in August *(2)*. It also had the benefit of bunker ice. Note that the lettuce, which was 65° F. (18° C.) when packed, had cooled to 45° F. (7° C.) a few hours later, by the time the car was loaded. This was due to contact of the lettuce with crushed ice in the package. By the following day, commodity temperatures were 32 to 34° F. (0 to 1° C.) and throughout the rest of the trip they were 32 to 36° F. (0 to 2° C.) despite outside temperatures that were in the 90's for 4 days. Many thousands of cars of vegetables are shipped in hot summer months across the country iced in this manner, and the condition upon arrival is usually excellent because these low temperatures are maintained. This method of refrigeration requires a large supply of ice. As an example, the test car received a total of 45,000 pounds of ice of which 24,000 pounds was body ice, 10,300 pounds package ice, and 10,700 pounds bunker ice. This is a lot of ice to refrigerate 20,000 pounds of lettuce. By weighing the cars at the start and end of the trip, it was estimated that about half of the ice was melted in transit. That remaining in the package would give protection during marketing, but much of that left in the bunker and on top of the load could be considered surplus and of value only as a safety factor in case of delays or unusually warm weather.

Standard Refrigeration and Heavy Salting of Fan Cars for Frozen Food

Figure 8 shows a record of a frozen food shipment made in August and September from Seattle, Washing-

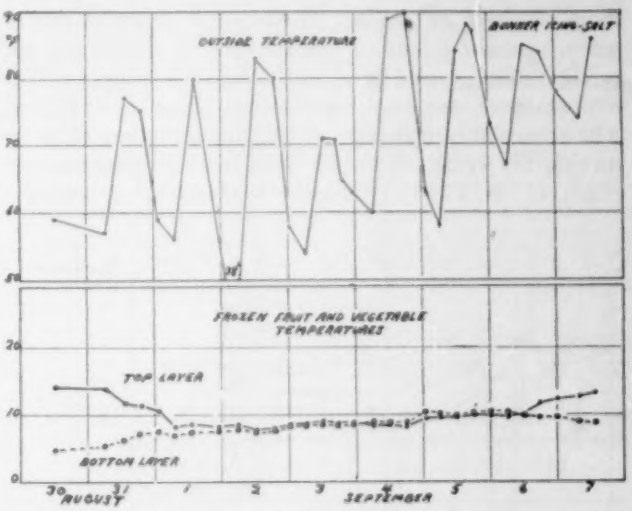

FIG. 8. Performance of fan car for frozen food; car pre-iced and salted to extent of 30 percent of ice supplied; bunkers re-iced and re-salted at same rate daily. Frozen beans, strawberries, raspberries, and spinach, Seattle, Wash., to Chicago, Ill. (Redit and Atrops. A. A. R.-U. S. D. A. Test 19, Car H-1947).

ton, to Chicago, Illinois *(10)*. A 40-foot car equipped with Preco fans and with 4 to 4½ inches of insulation was used in this test. It was pre-iced and salted several days before loading, salt being used in amounts equaling 30 percent of the bunker capacity. The bunkers were replenished with ice and re-salted twice before loading and were re-iced 7 times in transit, salt being applied at the rate of 30 percent of the ice supplied. Note that a temperature of about 10° F. (—12° C.) was about as low as could be maintained in transit *(10)*. Tests have been made with cars having as much as 6 to 7 inches of insulation, and a number of heavily insulated cars are in service for frozen food. Their chief advantage is in preventing warming up when standing; no lower transit temperatures have been possible with the heavier insulation. Trials have been made with a chemical, ammonium nitrate, that lowers the melting point of ice more than common salt does; but the cost was too great for the slightly lower temperature (6° to 8° F.) that it attained *(4)*. Other methods of getting lower temperatures for frozen food are being tried, such as continuous operation of car fans and the use of mechanical refrigeration. Before going too far in the direction of special equipment and added cost for the transit refrigeration of frozen food, the need for these lower

temperatures in transit must be established. A project sponsored by the Refrigeration Research Foundation is now under way at the Western Regional Research Laboratory of the U. S. Department of Agriculture in which a comprehensive study will be made of this question. Protection of frozen food from warming during loading and distribution at destination is part of the same general problem that needs attention.

Ventilation Service

Such commodities as tomatoes, which are customarily picked before they are ripe, bananas, and lemons are harmed by the usual refrigerator car temperatures. Tomatoes should not be held at less than 50° F. (10° C.) for any length of time, and bananas are even more sensitive to chilling. In shipping tomatoes during warm summer months a combination of ventilation and refrigeration is used; and in the late fall when outdoor temperatures are cool, ventilation alone is sufficient. The standard ventilation service for tomatoes calls for leaving the ventilators open until outdoor temperatures reach 45° F. (7° C.). Figure 9 shows a record of a

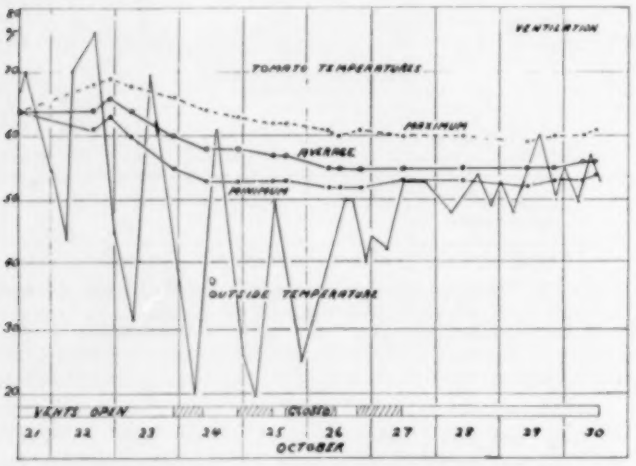

FIG. 9. Performance of refrigerator car under standard ventilation, vents open above 45° F. (7° C.). Tomatoes shipped fram Sacramento, Calif., to New York, N. Y. (Barger et al. A. A. R.-U. S. D. A. Test 21, Car 2, Oct. 1947.)

carload of tomatoes shipped under standard ventilation from California to New York late in October *(3)*. The tomatoes warmed a few degrees the day following loading but cooled thereafter because of the cold nights encountered in Nevada, Utah, and Wyoming. Although this was a fan car, the fans were not operated in order to compare it with one in which fans were used. There was no great difference in performance between fans and no fans, and this has been true in other tests under ventilation when no ice was used. If tomatoes are warm when loaded, say 75° F. (24° C.) or higher, the bunkers are usually iced at the first icing station to cool the load; and the vents may be closed a day or two thereafter and then opened and operated under standard ventilation. Fan operation in cars handled in this manner prevents bottom layers from becoming too cold and increases the cooling rate of the load.

The temperatures obtained in the car shown in Figure 9 were very satisfactory, for they prevented excessive ripening without stopping it completely. Forty to 75 percent of the tomatoes were still green when unloaded and the rest were firm ripe to turning in color.

Ventilation services for commodities that are not subject to chilling usually specify leaving vents open at temperatures above 32° F. (0° C.). A ventilation service has been worked out for late fall and winter shipments of non-precooled oranges from California that has been a good substitute for refrigeration *(7)*. Ventilators are left open to 20° F. (—6.7° C.) or even lower temperatures. This work has shown the need for knowing the temperature of the fruit within the car if advantage is to be taken of outside temperatures in ventilation. The same has been true for other fruits, such as apples and pears, which are often loaded into cars cold and then ventilated with air above 32° F. (0° C.).

Heater Service

The problem of protecting perishables from freezing during winter months is fully as important as refrigeration during warm weather. The common method of doing this is to place portable heaters in the bunkers of the car and light the heater in the front bunker when outside temperatures drop to 10° F. (—12° C.) and the one in the rear at —5° F. (—20.6° C.) ("Carriers Protective Service Against Cold"). The rear heater is extinguished at temperatures above —5° F. (—20.6° C.) and the front heater above 10° F. (—12° C.). The most common fault of heater service is the occurrence of too warm temperatures in the top layers of the car *(5)*. One way to help this situation would be to light heaters when temperature at the coldest place inside the car (bottom doorway) became too low rather than to follow the present practice. This would call for a temperature-indicating device. Thermostat control of heat output of the heaters, based on temperatures within the car, has given improvement in temperatures. Air circulation by built-in car fans has been of real benefit in preventing freezing and in preventing overheating of top layers. Figure 10 shows the record for a non-

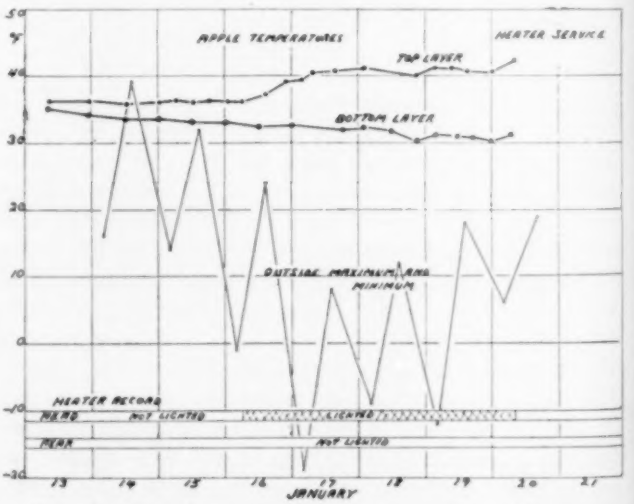

FIG. 10. Non-fan car under heater service with charcoal heaters thermostatically controlled. Apples shipped from Yakima, Wash., to Chicago, Ill. January, 1948. (Redit and Smith. A. A. R.-U. S. D. A. Rept. of Tests 22-27, Car 25 H.)

fan car under heater service with thermostatically controlled charcoal heaters *(11)*. The test was made in January, 1948, with apples from Yakima, Washington, to Chicago, Illinois. As indicated, outside temperatures of 0° F. (—17.8° C) or lower were encountered on 4 days with a minimum of —19° F. (—28° C.) on January 17. The rear heater was not lighted since —10° F. (—23° C.) was experienced for only a short time. Note the spread between top-layer and bottom-layer temperatures, despite thermostatic control of the heater. A better record was obtained in a fan car in which thermostatically controlled alcohol heaters were installed *(9)* (Figure 11). One of the advantages of fan cars is that the heaters may not have to be lighted

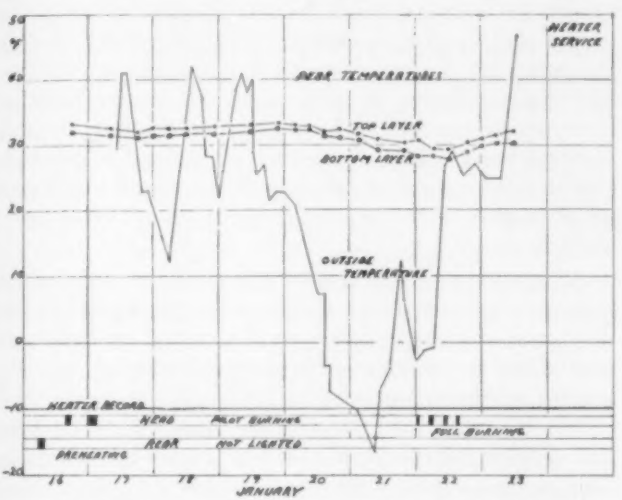

FIG. 11. Fan car under heater service with alcohol heaters thermostatically controlled. Pears shipped from Yakima, Wash., to Chicago, Ill. January 1947. (Redit and Smith. A. A. R.-U. S. D. A. Tests 12-15, Car 26 B.)

during short periods of cold weather because of the mixture of air effected in the car by the fans. Note that in this test, the heaters were not lighted until the day following the cold weather of January 21. The general conclusion from two seasons' work on heater service conducted jointly by the Association of American Railroads and the U. S. Department of Agriculture is that regardless of the type of heaters used, fans were needed in the cars to prevent too high temperatures in the top layers of the load *(11)*.

Summary

The modern car, which has built-in fans, collapsible bulkheads, 3½ to 4 inches of insulation, and end bunkers holding 11,000 pounds of ice or more, performs well under most of the services for which it is used. As a precooler it will do a good job in about 24 hours; and under bunker refrigeration service it is capable of maintaining temperatures about 40° F. (4° C.) or less. By judicious salting of the ice, temperatures close to 35 to 36° F. (1.7 to 2° C.) can be maintained throughout the load. Under maximum salting for frozen foods, temperatures of about 10 to 15° F. (—12 to —9° C.) can be held in transit. Body and package icing, commonly used for leafy vegetables, give transit temperatures in the range of 32 to 36° F. (0 to 2° C.). When temperatures in the 50's or 60's are needed, for such sensitive commodities as tomatoes, ventilation or a combination of ventilation and refrigeration can be use. In cold weather ventilation is sometimes used instead of refrigeration. The chief problem in heater service is to avoid overheating, and use of fan cars and thermostatically controlled heaters has been of great benefit in this respect.

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Industrial and Legal Viewpoints

Sanitation Problems in the Fishing Industry[a]

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The author reviews progress in solving sanitation problems in the fishing industry and makes recommendations regarding further progress in this field.

A few years ago the Northeast Section of I. F. T. held an all day meeting. During the morning, several papers were presented in which the fishing industry was subjected to a considerable amount of criticism for laxity in sanitation. When the chairman suggested that the speakers would be happy to answer any questions which may have occurred to the audience, only one was asked, and that was whether or not fish would be served for lunch.

It is regrettable that some of the factors mentioned that day which prompted the lone question are still unsolved problems in the industry. On the other hand, considerable progress has been made on many of them and others have been solved in accordance with the best available technical information.

The fishing industry is no different than any other food industry as far as the usual every-day problems of sanitation are concerned. By "usual, every-day sanitation problems" we refer, of course, to such problems as good housekeeping and rodent and insect control. However, since the fishing industry is very close to being the oldest industry in the country, our plants have had slightly longer to weather the storms and our rodents and insects are slightly older and, consequently, slightly wiser.

The usual, every-day problems are just that: every-day problems; and, of course, only constant attention keeps them from becoming acute and serious. It seems, however, that in a good many cases we have looked at these every-day problems with a more technical approach than heretofore, and by thought, design and adaptation have changed every-day to once a week, once a month, or even a longer interval and, at the same time, have greatly improved the efficiency of the control over the problems. For example, several years ago, insect control meant only a skillfully planted rubber boot, and rodent control consisted of a well-aimed shovel in the hands of a dock worker. Today the insect control program in our industry consists of adequate screening when conditions permit and frequent periodic application by thoroughly trained personnel of modern insecticides such as DDT, Chlordane, Hydrogenated Rotenone and Pyrethrins, to name a few, combined with such materials and procedures as "aerosols" and "mist spraying." In rodent control work, we have been extremely successful with installations utilizing ANTU and, in the plant of Gorton-Pew Fisheries Company, Ltd., the rigidly controlled use of 1080 in certain localities of our buildings has given us success which was previously thought impossible to obtain.

[a] Presented before the Northeast Section, I. F. T., Boston, Mass., Feb. 7, 1949.

An important factor in any food processing plant is, as we all know, its water supply. We in the fishing industry are fortunate, that is, most of us are, in having one of the largest water supplies possible available right in our own backyard. Of course, we realize the limitations of this source of water and our obligations to the consuming public with regard to its use. For many years this company has chlorinated all of the salt water supply used freely in all its wharf and cutting room operations to meet drinking water standards. Within the past year, however, we have gone one step further with the application of an in-plant chlorination installation which automatically maintains a free chlorine residual beyond the break-point. Thus we have available throughout our system not only a completely sterile water supply, but one containing a bactericidal agent at all times.

A survey was made during the earlier months of the installation to determine the value of this treatment and the accompanying table presents some of the data that was collected. Sampling stations were chosen throughout the plant and samples of incoming fish, scaler discharge water, drips from cutting belts, swabs on belts and cutting boards were taken at two-week intervals. The counts which were obtained, of course, showed some variation, but, in general, after several samplings a definite pattern became noticeable. The survey was divided into three parts: a 6-sample period of Break-point Chlorination, with residuals of 5 to 10 p.p.m. during the day and 25 p.p.m. during the clean-up periods; a 6-sample period of Marginal Chlorination, with residuals of 0.1 to 0.2 p.p.m.; and a repeat period of the Break-point type. In order to compensate for the variations in counts which occurred in Station 1, which represents incoming fish from the boats, all of the Station 1 counts were considered equal to 1 and the

AVERAGES OF RATIOS OF STATION COUNTS TO INCOMING FISH

Station	Break-point Chlorination 5 p.p.m.	Marginal Chlorination 0.1-0.2 p.p.m.	Break-point Chlorination 5 p.p.m.
1	1.0	1.0	1.0
2	0.06	20.2	0.022
3	2.3	295.0	0.09
4	0.4	39.2	0.14
5	0.5	43.6	0.28
6	1.1	191.0	0.67
7	3.3	20.5	0.16
8	0.35	216.0	0.32
9	1.1	29.8	0.17
10	4.5	29.7	0.63

Station 1—Incoming fish
Station 2—Drip from scaler
Station 3—Drip from belt leading from scaler
Station 4—Swab of same belt
Station 5—Drip from far end of same belt
Station 6—Drip from cutting belt nearest scaler
Station 7—Swab of same belt
Station 8—Drip from far end of same belt
Station 9—Swab of cutting bench
Station 10—Finished fillet from brining tank

corresponding counts for each sampling station were computed as ratios to this figure. This table simply shows the averages of these ratios to incoming fish counts. In general, the ratios during Break-point periods are less than 1, indicating considerable bacteria destruction, while during Marginal Chlorination periods, the figures indicate clearly that build-ups in counts throughout the room were common.

Apart from the bacteriological data which was obtained during this survey, two other direct benefits from the use of break-point chlorination were noted. The first was marked reduction of odors in the areas serviced by the salt water supply and the second was the elimination of slime on working surfaces which come in contact with this water. There is no question that both of these benefits tend toward the aesthetic side, but the presence of any off-odors in a plant is not a healthy condition nor conducive to a good product; furthermore, its effect on customers and guests who are visting is not desirable.

C. H. Castell of the Fisheries Research Board of Canada in "Progress Report of the Atlantic Station No. 40" reports that it required about 200 p.p.m. free chlorine residual to affect the flavor of fillets and about 2000 p.p.m. to affect the color. Since we were operating with a residual of 5 to 10 p.p.m. while operating and 25 p.p.m. during clean-up periods, we were confident that no harmful effects would result from this work and we are in complete agreement with the statement by Mr. Castell that, "It is safer and cheaper to increase the keeping quality of fillets by keeping the bacteria from getting on them by having sanitary surroundings, rather than by trying to destroy the bacteria on the fish by chlorinating them."

Another source of trouble in our industry which is somewhat allied to water treatment and which must be very carefully watched, is brine tank contamination. The mechanical action of flushing of fillet surfaces in brine prior to packaging and freezing very quickly builds up high bacterial counts in the brine as well as the dissolved and suspended protein concentration. For some time the only control of this problem was change of the brine at frequent intervals. Temperature control of the brine is an aid toward solving this problem, but it is definitely not the complete answer; consequently, a great deal of work has been done on this problem in recent years and is continuing. Chlorination has proven to be effective to some degree, but in many brine systems it is not completely satisfactory because residuals are difficult to maintain at predetermined levels. This difficulty arises because of the large amounts of organic materials present in brining systems, and the lack of a constant flow of fillets to and from a good many of them. Some work has been done on the use of quarternary ammonium compounds in connection with this problem, but these substances, too, have drawbacks. There is no doubt of their effectiveness in the sanitizing of the brine system, but difficulties in method of application are still bothering us to some extent. The most recent approach to the solution of this problem is the use of ultraviolet radiation combined with filtration but, here again, although we are able to demonstrate effectiveness, difficulty in adaptation of design of equipment is still a source of trouble. It appears, however, that before very long either one or combinations of more than one of these methods of treatment will give us brine to use for much longer periods, with its quality level, from the standpoint of sediment and bacteriological condition, raised to a much higher plane than has heretofore been reached.

General cleaning methods within our industry have, like the other factors mentioned above, also been changed to some degree. The packing of fish products is, by nature, not an easy job from the standpoint of wetness, waste and trimmings. To quote my good friend, Mr. John Kaylor, "One can no more fillet fish without producing some scrap than one can saw a board without producing sawdust. But, the presence of these bits of fish accumulated to an unnecessary degree or left for long periods without removal is an unsanitary practice and is not to be tolerated." The cleaning of equipment in fish processing plants is still, primarily, a scrub and rinse project, but some of the scrubbing necessary has been reduced, by the use of modern detergents, wetting agents and salt water soaps, while the over-all efficiency of the cleaning program has been increased. Since in our industry the removal of protein is the primary problem, some detergents are valuable and others are worse than useless. Considerable attention is due the temperature of the water that is used. Warm water is sometimes valuable, at other times hot water coagulates finely divided protein so severely that the removal job becomes more difficult than if heat were not applied. Live steam for some applications does a superlative job, but if thermophilic organisms are present, then warming up the equipment during a clean-up prior to an 8 or 10 hour shutdown is apt to cause difficulty. Considerable success has been attained through the use of a high pressure pump which supplies water at 500 pounds per square inch, and at that pressure the material clinging tenaciously to the equipment is rather easily dislodged and then flushed away with large volumes of water at normal pressures.

Advancement in cleaning methods is, of course, also due to improvement in equipment design. In many of the plants in our industry one can still find wooden equipment of varied ages; but, also, one can find that the use of galvanized iron and, best of all, the use of stainless steel is becoming more common than in the past. The corrosion problem in the fisheries is probably the most severe of any food industry with salt, water and salt air always present. Corrosion is, of course, an enemy of good sanitation practice, since nothing can be more difficult to keep clean than an apparently smooth surface that is pitted. The intelligent use of the correct type of stainless steel for each individual application has done much to improve the over-all sanitary condition of our industry. There is still much to be done along this avenue, however, before we will be able to rest even for a moment.

Any discussion of the sanitation program in a food industry should include a few remarks about the personal habits of the people employed in it. In many of our plants you will see workers who are neatly attired with suitable coverings for the head and hands. In addition, physical examinations are a prerequisite to

employment in a good many companies. All other efforts to improve sanitation can be nullified unless an adequate program of employee education is maintained.

In this discussion of sanitation and fish processing, past and present have been considered, and this paper should be brought to a close with just a glimpse into the possible future. It is very certain that within a reasonable length of time our industry will undergo a drastic change, and when that change occurs, we will find that definite standards have been established for factors which, today, seem intangible. Most technologists in the industry are united in the belief that it is much wiser to develop these standards; actually, we are welcoming the opportunity to do so and a good deal of the technical work in the industry is aimed at just these very problems. For example, which are the organisms that give us the most trouble and what is their resistance to the known germicidal agents? What does an actual bacteria count of 500, 5000 or 5,000,000 on equipment mean with respect to the keeping qualities of our products? How does the presence of germicidal agents incorporated in the ice we use aboard our vessels affect the sanitary characteristics of these vessels and, consequently, the quality of our merchandise? What cleaning methods in use at sea are important toward the maintenance of conditions we desire and how will the addition of chlorine or quarternary compounds to the boat's own supply of water affect these same conditions? How can we ourselves, best inform our customers of those brands and products that represent organizations which are making every effort to continually improve their techniques and, lastly, how can we, ourselves, best inform customers of those brands and products that represent organizations which are content to 'just get by'?

These questions, and these are but a few, represent the challenge which we in the fish processing industry are attempting to meet.

Notes and Letters

Volatile Fruit Concentrates Now Free from Tax

To the Editor, Food Technology:

Because of the active commercial interest in our process for production of volatile fruit concentrates, we have endeavored to keep industry promptly informed of any significant developments which pertain to this subject.

As these volatile fruit concentrates are produced by distillation and generally contain a half percent or more of alcohol, they have been subject to the usual taxes and restrictions on such products. However, on August 17 a bill, H. R. 5270, which exempts volatile fruit concentrates of reasonable alcohol content from certain taxes and other restrictions, was signed by the President and became Public Law 240, 81st Congress. This Act amends subchapter E of chapter 26 of the Internal Revenue Code.

The regulations pertaining to this amendment define the limits of alcohol content and the conditions under which volatile fruit concentrates may be produced and used. These regulations have now been published in the Federal Register of September 27, 1949, pages 5869 to 5879, inclusive. Copies of this issue may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. The regulations became effective on the date of publication in the Federal Register.

Inquiries concerning the new code should be addressed to Mr. Carrol E. Mealey, Deputy Commissioner, Alcohol Tax Unit, Treasury Department, Washington, D. C.

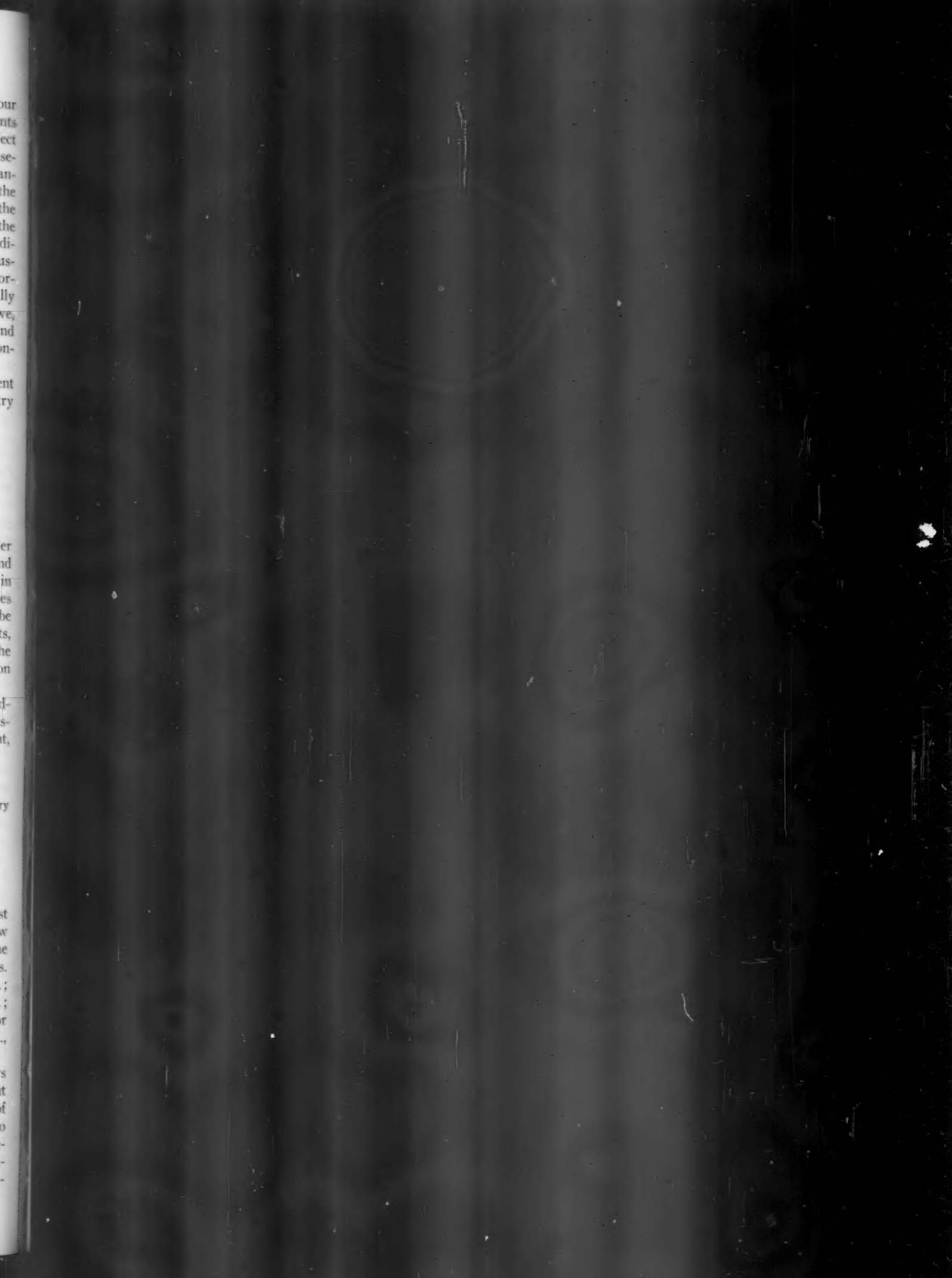
P. A. WELLS, Director
Eastern Regional Research Laboratory
Bureau of Agricultural and Industrial Chemistry
United States Department of Agriculture
Philadelphia 18, Pennsylvania

Oil Chemists Told Latest Developments in Monoester Field

It was recently reported to the American Oil Chemists' Society in Chicago that glyceryl monoesters of fatty acids, widely used during the past decade as baked-goods "improvers" and cosmetic emulsifiers, can now be prepared in much purer and more potent form than has been available in the past. It was announced that the purified distilled "monoglycerides" are now commercially available with a minimum monoester content of 90 percent. This statement is significant in view of the fact that similar mixtures previously on the general market have contained from 30 to 50 percent monoester.

Addition of only 1¼ percent of one of the new distilled "monoglycerides" to the shortening of an experimental sugar-rich "gold" cake batter has a greater effect in increasing the volume of the finished cake than addition of 10 percent of the older type of monoglyceride, although, for best results in texture and other cake properties, full proportions of normal shortening must still be used, it was stated. It is believed that the new product will have at least four times the activity of the older material in other types of cakes and baked goods. Analytical data are: glycerol content, 2.5 percent max.; free fatty acid content (as oleic), 1.0 percent max.; saponification value, 150-160; iodine value, 75-85; color (5¼" Lovibond), 15Y/1.5R max.; M. P., 52° C., 125.6° F. (approx.); specific gravity, .93 at 60° C.

The enhanced properties of the distilled monoesters are primarily due to the high monoester content, but additional benefits are believed due to the absence of diesters, metallic soaps and residual catalyst, and to the low content of glycerol and free fatty acids. Previous commercial methods have been unable to separate all these substances effectively from the surface-active monoesters.



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Write to regional secretary, if within an area covered by a regional section, or to the Secretary of the Institute, for an application form and information regarding qualifications and classifications.

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1949 MEETING, SAN FRANCISCO

See Program Announcement on page 19, following "Selected Abstracts"

Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

1949 CONVENTION IN SAN FRANCISCO

Plans for the 1949 Convention in San Francisco (July 10-14) are progressing rapidly, and hotel reservations are already pouring in. The United Air Lines have been designated as the official air route to the Convention. The railroad transportation is being covered by the Southern Pacific Company and the Santa Fe Railroad Company. Every member on the national roster will be contacted by these carriers. Make your reservations early, in order to be sure of accommodations.

A LETTER FROM PRESIDENT H. C. DIEHL TO REGIONAL SECTION CHAIRMEN AND MEMBERS OF I. F. T.

November 10, 1948

A very enjoyable meeting with the Northern and Southern California Regional Sections at Los Angeles reminds me that I owe you all an informal memorandum on what has taken and is taking place in the Institute. I am still seeking to adapt my travel schedule to the dates of as many Regional Sections as I can, so that I can meet with you personally during the year. But the country is very, very large, my travel dates to specific areas and Section meeting dates are difficult to harmonize, and besides the Foundation also has jobs for its Director—so the problem of meeting with you is not easily solved.

Council Meets January 16

The Institute Council will meet on January 16, 1949, at the Lafayette Hotel in Atlantic City. May I suggest that you discuss in your Section meetings the matters to be brought by the Councilors to the attention of the Council at this mid-year meeting. Please notify Carl Fellers as soon as possible of the subject matter that should be placed on the Council agenda.

Publicity for Annual Meeting in San Francisco

The Institute Program Committee (Emil Mrak, Chairman) and the San Francisco Conference Committee of the Northern California Section (Ray Junk and Hugh Griswold, Co-chairmen) have both been most active and productive in their planning and implementing. The San Francisco program is shaping up unusually well and will be released to you just as soon as Emil Mrak gives the green light.[a]

On Saturday, November 6, Arthur Prater, Chairman of the Institute Committee on Publicity, met in Berkeley with others concerned with the publicity work for the annual conference in July to bring about, at my request, a working link between the general publicity of the Institute and the specific conference publicity. Present were Hugh Griswold, Walter Richert, Carl Havighorst, Elverton Stark, Alan Richardson, Arthur Prater, and myself. Clear delineation of duties and responsibility for all concerned were achieved and besides, in the interests of long-range planning, we hope to leave a record of procedure and results for future use by the Institute.

Consolidation—An I. F. T. Objective

This statement brings me to one of the objectives of my administration—consolidation of our organizational procedures so that each new administration of the Institute will find evidences of continuity in procedure and policy to guide it, without lost time and effort.

As President I am asking every Committee of the Institute not only to carry on its duties for the current year but also to study its function in the Institute and to recommend the adoption of demonstrated functions as continuing or new policy in the best interests of the Institute, as each committee sees this. Perhaps some committees may decide that they do not effectively serve an objective. In any event let us get all of the facts that we can so that the Institute Committee on Organization (William Campbell, Chairman) which has for your President a very important function this year, and the Institute Council may have the benefit of the thinking of many members of the Institute. From this thinking, at administrative level, can be distilled the most effective action to be taken by future administrations in the conduct of the Institute's business.

Recognition—We're Getting It

Our actions in the field of recognition for the Institute have already borne fruit. As liaison representative of the Institute on the Food and Nutrition Board of the National Research Council, Fred Blanck has been appointed. The Committee for Liaison with the Armed Services (Milton Parker, Chairman) is now exchanging correspondence with General McAuliffe of the General Staff of the Department of the Army in consideration of two major points: (1) recommendation of an Institute committee as the most effective functional relationship between the Institute and the Department of the Army either during periods of peace or in event of an international emergency and (2) committee recommendations for procedure in supplying Army needs for trained food technologists during a period of peace, during a period of expansion prior to actual mobilization, or during a war period.

This committee is also in touch with General Hershey, Director of Selective Service, and the Chairman of the National Security Resources Board.

Publication Plans Progressing

One of the most urgent and important decisions to be made in the interests of the Institute has been that dealing with procedure in solicitation of advertising for FOOD TECHNOLOGY. The Committee on Publications, notably its Chairman, Walter Pheteplace, has done a yeoman's job for the Institute in analyzing the action of other professional societies and the results of their journal advertising programs.

As a result of two conferences in Chicago and Los Angeles between John Knowles and Philip Bates, mem-

[a] Announcements regarding the program plans appear on the final pages of this issue.—Editor.

bers of the committee, the committee Chairman and the President and Secretary-Treasurer of the Institute, the decision was made after long deliberation to have the advertising handled by a professional advertising representative rather than by an advertising committee of the Institute. Advantages and disadvantages of both methods had to be weighed in prolonged discussion in order to make an arrangement which would give maximum financial return to the Institute.

If the Institute had a permanent business office and Executive Secretary it is likely that we could have advantageously handled the advertising ourselves, but facts confronted those who had to make the decision, who in the final analysis was the President himself, and he has made it deliberately as the best one possible under the circumstances.

John Knowles has taken the assignment of having a contract prepared which will protect the Institute interests adequately and is really more favorable to us, though still acceptable to the advertising representative, than any previously before the Institute.

Thus, while the Council in June authorized the employment of an advertising representative, the painstaking work of the Committee on Publications and the effects of time for further study and reflection have resulted, I believe, in a better "deal" for the Institute than we were originally prepared to accept.

Toward Larger Membership—More Sections

In the field of membership and Regional Section extension, the respective Institute Committees (Larry Heid and Roger Wilson, Chairmen) are working faithfully in the interests of the Institute. In Georgia, in Virginia, around New Orleans, in West Texas, in Oregon, in the Twin Cities, in British Columbia, in Eastern Canada—in all these areas active consideration of the matter has been in progress. This does not mean that Regional Sections will at once arise in all of these areas; in fact, it is better for the Institute if the growth in this respect is gradual. But you may be assured that all desirable expansion of the Institute is being considered and fostered.

The amendments proposed to membership recently by the Constitution Committee (E. S. Stateler, Chairman) have now been approved. The Constitution Committee is now studying the recommendations of the Committee on Student Groups (Charles Smith, Chairman) regarding the procedure for implementing student membership in I. F. T. under the Constitutional procedure.

A Basic Need—An Executive Secretary

Very active consideration is being given to the eventual appointment of a salaried Executive Secretary for the Institute and the selection of its business headquarters. The final action is not likely to take place in this administration. Financial preparation is necessary, through increased membership dues and income from advertising and other sources. This preparation must be so thorough that there is no doubt about continuity of the headquarters undertaking, once it has been implemented. The Committee on Budget and Finance, through its Chairman, Philip Bates, plays a large role in this decision. At present it seems to us that the earliest moment for initiating this undertaking is the latter part of 1949, but it is now definitely in sight.

I can assure you all with utmost sincerity that daily conduct of the business of the Institute by a salaried Executive Secretary, of demonstrated capacity for the job, will do more than anything else to give that continuity of action and policy which is so essential to the best functioning of the Institute in the future.

Responsibilities of I. F. T. Are Increasing

As the Institute grows (especially now that it is represented in the four corners of the country and in regions between), it is urgent that we study thoroughly and with an open mind, our mode of functioning, so that changes in our responsibility and influence, which creep up almost imperceptibly as we grow, will be recognized and met with necessary action. This does not mean that the Institute should be super-sensitive to every proposal for change in its organization or activity, because modern life, in my opinion, already makes us too sensitive to outer influences and too quick to speak and act. But the Institute should continue to be alert to essential changes having good influence on its future, made after full deliberation and lapse of sufficient time to let things "jell," and then implemented in a progressive spirit. Thus we follow the fine traditions of the Institute's history, and meet the demands of a rapidly changing modern environment.

I hope that my somewhat chatty report interests you; my reason for addressing it to you is solely that I think Institute membership should know more about its current business. Perhaps some day there will be a better vehicle for such progress reports than this memorandum, which I am sending with my best wishes.

Sincerely yours,

H. C. DIEHL, *President*

FOOD TECHNOLOGISTS IN BRITISH COLUMBIA

LETTER TO THE EDITOR, NOVEMBER 19, 1948:

The last issue of FOOD TECHNOLOGY carried a note regarding the development of Food Technology groups in Canada. You will be interested in some of the organization that has taken place in the Vancouver, B. C. area.

Last April about twenty persons interested in Food Technology organized an informal group in Vancouver. By the end of May this group had grown to a membership of about forty-five. The fall meetings, three of which have been held to date, have been encouraging in the response shown by persons towards food technology. The membership to date is over seventy. Of this total, there are about 18-20 who are now members of the I. F. T.

The group, now known as the B. C. Food Technology Group, thought it advisable to remain unaffiliated with either the Canadian or American group during their first year or until it was indicated that sufficient interest was present in this area to sustain a permanent organization.

We have endeavored to obtain speakers who will emphasize the fundamental work in Food Technology and will illustrate how these developments have been useful and advantageous in industrial practices. At the two spring meetings we were favored by talks by Dr. H. L. A. Tarr of the Pacific Fisheries Experimental Station on the "Browning Reaction," and by Mr. W. W. Blankenbach, Chief Chemist for the B. C. Sugar Refinery, on the "Story of Sugar." In September, Dr. Paul Trussell, head of the Nutritional Division of the B. C. Research Council, spoke on the "Microbiology of Food Processing." At the October meeting, Dr. J. R. Campbell, Professor in the Dairy Department at the University of B. C., discussed the subject of "Enzymes," and their application in food manufacture. Mr. A. W. Lantz of the Fisheries Experimental Station discussed the "Meat Processing Industry" at the November meeting.

The speakers for the subsequent months through April have been arranged for, and will cover the subjects of "Food Processing Equipment," "Canadian Food and Drug Act," "Nutritional Aspects of Cooking," and "Sanitation."

The interest in Food Technology has been materially advanced in B. C. during the past year or so by the newly formed Food Technology courses given at the University of B. C. under the direction of Dr. B. A. Eagles. I was instrumental in having our Company offer the first scholarship in food technology at the University, to be called "The Nabob Foods Scholarship." Next May, the University will graduate its first students from the five-year course in Food Technology.

The present committee members are, Mr. J. C. Barr, Commercial Chemicals Ltd., Dr. N. E. Carter, Pacific Fisheries Experimental Station, Dr. B. A. Eagles, University of B. C., Mr. G. Roger Wood of the Woods Laboratory, and myself. The last two are Secretary-Treasurer and Chairman, respectively.

I trust that this information will be of interest to you and I. F. T. members.

Yours truly,
C. Wilson Eddy,
Research Department,
Kelly, Douglas & Co.
Vancouver, B. C.

POSSIBLE NEW REGIONAL SECTION

In the Virginia-North Carolina coastal area, steps have been initiated by Colonel Charles S. Lawrence (President of the Quartermaster Board at Camp Lee, Virginia) relative to the possible formation of a regional section in Richmond. Considerable interest has already been indicated, and it is hoped that in a few months I. F. T. may welcome a new regional section.

STUDENT GROUPS

Active groups of students who will be future food technologists are already in existence at Michigan State College, at the University of California (Berkeley), and at Oregon State College, under the sponsorship of Professor Roy E. Marshall, Professor Reese H. Vaughn, and Professor Ernest H. Wiegand, respectively.

An active student group has recently been formed at the Massachusetts Institute of Technology under the name of the "Samuel Cate Prescott Chapter." The purpose of this organization is to acquaint the members with the activities of the National I. F. T. and the Regional Sections, to promote a professional feeling, to disseminate technical information, and to foster social activities enabling the members to become better acquainted. A constitution has been drawn up, and officers have been elected as follows:

President.....Herbert V. Shuster
Vice-President.....Pressley W. Jones, Jr.
Secretary-Treasurer.....Leonard A. Levenson
Chairmen of Committees:
Program.....Darshan S. Bhatia
Social.....Kenneth S. Rymal
Publicity.....Paul B. Butler

The first meeting of the Prescott Chapter after its inception was held on November 22, 1948. On this occasion, Professor B. E. Proctor, I. F. T. Vice-President, gave a short, introductory talk and then the main speaker of the evening, Dean Samuel C. Prescott, spoke on the subject of "Tea and Coffee." Motion pictures on "Bananas" and on the "Nutritional Aspects of Food" were then shown. Approximately fifty students, faculty members, and guests were present, interest in the organization was high, and there is every indication that the organization will have a bright future. It is planned to hold meetings about once a month.

RECOGNITION

Barbour L. Herrington, Professor of Dairy Chemistry at Cornell University, Ithaca, New York, has received the Borden Award in Chemistry of Milk for his research in dairy chemistry at Cornell University. The award was presented to him on September 13, 1948, in Portland, Oregon, on the occasion of the Western Session of the 114th National Meeting of the American Chemical Society.

Dr. Roy C. Newton, a former National President of I. F. T. and now Vice-President of Swift & Co., Chicago, was presented with the Honor Scroll of the Chicago Chapter, American Institute of Chemists, at a dinner in Chicago on October 8, 1948.

The Institute of Food Technologists is proud of the scientific recognition received by these esteemed members and extends to them heartfelt congratulations.

Dr. Donald K. Tressler, of Westport, Connecticut, represented the United States in Copenhagen, Denmark, on October 11-20, 1948, at a Conference on Refrigeration and Freezing of Food under the auspices of the Food and Agriculture Organization of the United Nations. Representatives of sixteen European countries conferred on technological problems of food refrigeration. Dr. Tressler presented several lectures and gave instruction in the most recent American methods of freezing food.

Dr. J. A. Shellenberger, head of the Department of Milling Industry, Kansas State College, Manhattan, spent two months in the fall of 1948 in Costa Rica and El Salvador on an assignment for the Food Supply Division of the Institute of Inter-American Affairs.

Z. I. Kertesz, Professor of Chemistry at the New York State Agricultural Experiment Station, Geneva, has been granted a sabbatical leave to carry on studies in Australia. At the joint invitation of the Division of Food Preservation and Transport, CSIR, the Australian Chemical Institute, and the Food Technology Association, he left Geneva early in November to study, for six months, the biochemical aspects of food production and processing in Australia. His headquarters are at the Chemistry Department, Sydney Technical College, Ultimo, Sydney, N. S. W.

NICHOLAS APPERT AWARD

The Chicago Section has announced that the Committee of Judges on the Nicholas Appert Award has selected Dr. Roy C. Newton, Vice-President of Swift & Company, Chicago, as the recipient of the medal in 1949. Congratulations are extended to Dr. Newton, who will receive this honor in recognition of his outstanding accomplishments in the field of food technology.

ACTIVITIES OF I. F. T. MEMBERS IN OTHER ORGANIZATIONS

A development of interest to all food technologists and sanitarians is the National Sanitation Foundation's sponsoring of clinics in which the panels are equally divided between industry and the United States Public Health Service. In June 1948, a 5-day meeting was held at the University of Michigan School of Public Health, in Ann Arbor, Michigan. At this time Mr. George W. Shadwick, Chief of the Quality and Control Laboratory of Beatrice Foods Company and a member of the Chicago Section of I. F. T., was appointed co-chairman representing industry, and Mr. Russell Hart of the United States Public Health Service, 7th Area Office of Kansas City, Mo., was appointed co-chairman representing the U. S. Public Health Service. It is hoped that such concerted efforts on the part of industry and the U. S. Public Health Service will accomplish much in solving problems in food handling.

The Chicago Technical Societies Council held a dinner meeting on September 22, 1948, entitled "Meeting the Editors." The Chicago Section of I. F. T. was represented at this meeting by E. S. Stateler, J. M. Jackson, M. E. Parker, and L. A. Hall.

At the American Meat Institute's meeting in New York City in September 1948, Victor Conquest of Armour & Company, Chicago, talked on the "Future of Animal Fats." He also spoke on "Egg Products" at the October meeting of the Mid West Section, American Association of Cereal Chemists.

At the meeting of the Iowa Sewage Works Association in Des Moines, Iowa, Robert W. Bates of Armour & Company, Chicago, presented a paper on "A Discussion of Packing Plant Waste Disposal."

At the meetings of the American Chemical Society held in Portland, Oregon, in September 1948, papers were given by I. F. T. members as follows:

W. V. Cruess (Berkeley, California). "The Effect of Adding Crude Plaster of Paris to Sherries Before and After Fermentation of the Juices." (Joint with Irene Brajnikoff).

Lionel A. Farber (San Francisco, California). "Evaluation of Indexes for Spoilage of Fish."

At a symposium on marine products, held in connection with the same meeting in Portland, the darkening of crabmeat by iron sulphide was discussed by Ray W. Clough, O. Eugene Shostrom, and Ernest D. Clark (all of Seattle, Washington).

Ernest C. Crocker (Cambridge, Mass.) is Chairman of the Northeastern Section of the American Chemical Society for 1948-49, and Bernard E. Proctor (Cambridge, Mass.) is a member of the A. C. S. Public Relations Committee, 2. Special Committees.

I. F. T. members at present serving on the Frasch Foundation Awards Committee, American Chemical Society, are Bernard E. Proctor, Chairman, Frederick C. Blanck, Charles N. Frey, Frank L. Gunderson, and Roy C. Newton.

The American Chemical Society's Committee on the Borden Award in the Chemistry of Milk is presently composed of I. F. T. members as follows: Ira A. Gould, Jr. (College Park, Md.), Chairman, Harry J. Deuel, Jr. (Los Angeles, Cal.), and Conrad A. Elvehjem (Madison, Wis.).

Roy C. Newton (Chicago) is a member of the Constitution and By-laws Committee, American Chemical Society.

The meeting of the Executive Committee of the Refrigeration Research Foundation, held in Chicago in the fall of 1948, was attended by Helmut C. Diehl (National I. F. T. President), Director of the Foundation, and Dr. S. C. Prescott, Dean Emeritus of Science, Massachusetts Institute of Technology.

Carl R. Fellers (National I. F. T. Secretary-Treasurer) is Chairman of the A. C. S. Division of Agriculture and Food Chemistry, L. E. Clifcorn (Chicago) is Vice-Chairman, and Arthur N. Prater (Los Angeles, Cal.) is Secretary-Treasurer.

James M. Brown (Charlestown, Mass.) is Secretary of the A. C. S. Division of Sugar Chemistry and Technology, and Frederick W. Zerban (New York) is Councilor.

At a symposium on "Yeasts in Feeding" held in Milwaukee, Wisconsin, November 8-10, 1948, under the joint sponsorship of the Associates, Food and Container Institute, the Brewers Yeast Council, the Yeast Industry, and the QM Food and Container Institute, the following I. F. T. members participated:

Maynard A. Joslyn (Berkeley, Cal.). "Relation of Basic Investigations to Production and Utilization;" also "Nutrient Requirements."

Lawrence Atkin (New York). "Basic Principles of Culturing and Production."

Elsie Singruen (Chicago). Presided at sessions on Production and Composition.

Joseph E. McClary (St. Louis). "Dry Extracts, Pastes, Hydrolysates, Autolysates, Flavors."

Charles H. Keipper (Milwaukee, Wisconsin). "Commercial Production Practices."

Gustav T. Reich (Philadelphia). "Sugar Refining (Cane and Beet) By-Products."

William D. Ramage (Albany, Cal.). "Agricultural Wastes."

Johannes C. Hoogerheide (Milwaukee, Wis.). "Lipids."

Col. Charles S. Lawrence (Camp Lee, Va.). Presided at dinner.

Emil M. Mrak (Berkeley, Cal.). "Taxonomy, Morphology, and Variations."

At the scientific sessions of the 76th Annual Meeting of the American Public Health Association and meetings of related organizations, held in Boston, Mass., November 8-12, 1948, the following members of I. F. T. participated:

Edwin J. Cameron (Washington, D. C.), Robert W. Pilcher (Maywood, Ill.), and L. E. Clifcorn (Chicago). "Nutrient Retention During Canned Food Processing and Production."

Faith Fenton (Ithaca, New York). "The Effect of Freezing on the Nutritive Value of Foods."

Herbert E. Robinson (Chicago). "The Effect of Curing and Canning on the Nutritive Value of Meat."

Henry T. Scott (Madison, Wisconsin). "The Effect of Processing on the Nutritive Value of Milk and Milk Products."

Frederic W. Nordsiek (New York). "The Effect of Processing on Cereals and Bread."

Frank E. Mott (Boston, Mass.). "Direct Microscopic Clump Counts of Bacteria as Used to Control a Pasteurized Metropolitan Milk Supply."

Edward L. Holmes (Chicago). "Development of an Adequate Educational Program on Sanitation in a Typical Food Industry—the Baking Industry."

Norris H. Sanborn and Edwin J. Cameron (both of Washington, D. C.). "The Organization and Execution of the National Canners Association Program."

Max Levine (Ames, Iowa), joint with Sidney M. Bernstein. "The Effect of Borax on the Germicidal Efficiency of Alkali Washing Compounds."

DEATHS

It is with regret that the Institute announces the deaths of the following members:

Mr. Frank R. James, Purina Mills, 835 South 8th St., St. Louis, Mo.

Mr. Arthur B. Schell, The Hills Bros. Co., 64 Irving St., Brooklyn, N. Y.

Mr. Norman Hernhuter, Joe Lowe Corp., 2744 East 11th St., Los Angeles, Cal.

Mr. William H. Harrison, retired Research Director of the Continental Can Co.; died in North Hollywood, Cal., on August 7, 1948.

COMMITTEE CHAIRMEN, 1948-49

The roster of chairmen of regular and special committees of the Institute is as follows:

Budget and Finance	P. K. Bates
Roster of Scientific Personnel	F. C. Blanck
Selection of Institute Insignia and Membership Certificate	L. V. Burton
Institute Organization	W. L. Campbell
Regional Sections	J. L. Heid
Education and Curriculum	M. E. Highlands
Nominations of the Institute	Paul Logue
Selective Service Deferment	J. H. Nair
Publications	W. D. Pheteplace
Publicity	A. N. Prater
Student Groups	C. L. Smith
Constitution of the Institute	E. S. Stateler
Membership of the Institute	R. V. Wilson
Program	E. M. Mrak
Membership Qualifications	E. M. Chace
Liaison with the Armed Forces	M. E. Parker
Food Industries Award	S. C. Prescott
Stephen M. Babcock Award	H. C. Diehl
Procedure and Nomenclature in Objective Testing	W. A. Maclinn
Symposia	B. E. Proctor
Pectin Standards	J. J. Willaman
Liaison Representative of I. F. T. on Food and Nutrition Board, National Research Council	F. C. Blanck

Regional Section News

CHICAGO SECTION

On May 17, 1948, members of the Chicago Section were addressed by Dr. John H. Hetrick of the Dean Milk Company, Rockford, Illinois. The subject of Dr. Hetrick's talk was "Recent Technological Advances in the Dairy Industry."

On October 18, Milton L. Laing, Chief of the Quality Control Division of Armour & Co. and Past Chairman of the Chicago Section, addressed the section members on the subject "The Food Technologist in the Orient." At this same meeting, Milton E. Parker reported on the activities of the national I. F. T. Committee on Liaison with the Department of the Army. The Army is recognizing the profession of Food Technology and desires to explore means of cooperation with the Institute of Food Technologists.

On November 15, the speaker of the meeting was George F. Garnatz, Director of the Kroger Foundation, Cincinnati, Ohio. His topic was "A Retail Food Distributor Capitalizes on Food Technology."

The annual meeting held on December 13 had two main features, the election of officers, and a talk by our I. F. T. President, H. C. Diehl, concerning I. F. T. matters.

A committee has been appointed to investigate the possibility of incorporating the Chicago Section, with Byron M. Shinn as Chairman.

The Chicago Speakers Bureau, since its organization, has made arrangements for about fifty speaking engagements, thirty of them since January 1, 1948. Requests have been received largely from Chicago and environs, but also from Rockford, Ill., Nebraska, and Massachuetts. The speaking engagements have been evenly divided between men's and women's organizations, and their objectives have been to provide entertainment as well as information regarding food technology.

Vice-Chairman Charles L. Smith has been appointed a liaison officer to investigate preliminary preparations for the 1950 Conference in Chicago.

Colonel R. A. Isker has taken over the duties of Advertising Manager of THE VITALIZER, succeeding I. A. Rausch, who found it necessary to withdraw.

Appreciation of E. S. Stateler's splendid services to the Section during his nearly ten years as Secretary, Executive Committeeman, Vice-Chairman, and Chairman, was expressed by the Chicago Section in the form of a letter to the McGraw-Hill Co.

Dr. Lloyd A. Hall of the Griffith Laboratories and Dr. Percy Julian of the Glidden Company were the subjects of a radio address in June over Station WEEK of Peoria, Illinois, upon the occasion of a special broadcast, sponsored by the Peoria Section ACS, given by John E. Hodge of the USDA Northern Regional Research Laboratory.

Dr. Hall has been appointed sub-Chairman of the Program Committee for the 1949 I. F. T. Conference, with the responsibility for industrial and production papers.

Mr. George W. Shadwick, Chief of the Quality and Control Laboratory of Beatrice Foods Company, at-

tended a 5-day meeting of the Federal Food and Drug Association Conference at Portland, Maine, in June.

Dr. A. L. Elder, Director of Research, Corn Products Refining Company, went to Europe in the fall of 1948 to visit some of the company's foreign plants.

Dr. K. T. Swartz, formerly of the Continental Can Company (Research Department), has accepted a new position with the Quartermaster Food and Container Institute.

Dr. Virgil S. Troy, of the Continental Can Company (Research Department), recently announced his marriage to Miss Edna Peters of Washington, D. C.

Dr. R. W. Pilcher, Associate Director of Research, American Can Company, has been elected Vice-President of the Quartermaster Association, an association of reserve officers and civilians engaged in work in fields of interest to the Quartermaster General.

W. E. Pearce, E. H. Ruyle, O. R. Alexander, and P. W. Hardy (American Can Company) recently attended the meeting of the Association of Official Agricultural Chemists in Washington, D. C.

NORTHERN CALIFORNIA SECTION

On October 29 and 30, 1948, the Third Annual Conference and Joint Meeting of the Northern and Southern California Sections took place in Los Angeles. An exceptionally well organized program was presented, for which members of the Northern California Section gave talks as follows:

Prof. George L. Marsh (University of California). Subject: "Clouding of Beverages."

Dr. W. M. Martin (Schwarz Engineering Co., Redwood City). Subject: "Short High Temperature Sterilization and the Aseptic Canning Process."

Mr. William Pentzer (U. S. D. A., Fresno). Subject: "Recent Developments in Handling and Transportation of Fruits and Vegetables."

Mr. Charles D. Fisher (Coast Laboratories, Fresno). Subject: "Use of Epoxides in Food Preservation."

The discussion leaders for these talks were G. W. Kusserow (Gerber Products Co., Oakland), E. M. Mrak and W. V. Cruess (Department of Food Technology, University of California), and H. M. Pancoast (Food Machinery Corp., San Jose). The speakers were introduced by W. R. Junk (California and Hawaiian Sugar Refining Corp., San Francisco). W. V. Cruess served as Chairman of the afternoon session on October 29.

At the annual meeting of the Northern California Section on December 2, there was an all-day program as follows:

Strohmaier, Leonora H. (University of California, Berkeley). Subject: "Studies on the Toughness of Prune Skins."

Emerson, Oliver H. (U. S. D. A. Western Regional Research Laboratory, Albany). Subject: "The Problem of Bitterness in Navel Orange Juice."

Worthington, Oliver J. (Department of Food Technology, Oregon State College, Corvallis, Ore.) Subject: "Determination of Color in Light Colored Juices."

MacGillivray, John H. (Division of Truck Crops, University of California, Davis). Subject: "A Quality Grade for the Purchase of Canning Tomatoes."

Boggs, Mildred M. (U. S. D. A. Western Regional Research Laboratory, Albany. Subject: "Comparison of the Quality of Frozen and Dehydrofrozen Peas with Fresh and Stored Pod Peas."

Hungerford, E. H. (International Minerals and Chemical Corporation, San Jose). Subject: "Uses of Monosodium-Glutamate with Notes on its Manufacture."

Prince, R. N. (California & Hawaiian Sugar Refining Corp., Crockett, Calif.). Subject: "Quick Method for Determination of Degree of Inversion of Sucrose."

Lamb, Frank (National Canners Association, San Francisco). Subject: "Spray Residues (Progress Report)."

Somers, Ira (National Canners Association, San Francisco). Subject: "Problems in Use of Detergents."

Collier, C. P. (Research Dept., Food Machinery & Chemical Corp., San Jose). Subject: "General Physical and Chemical Aspects of Food Preservation with Epoxides."

Murphy, J. R. (Research Dept., Food Machinery & Chemical Corp., San Jose). Subject: "Studies on the Thermal Resistance of Spores of Certain Putrefactive Anaerobes."

Dimick, K., and Ponting, J. D. (U. S. D. A. Western Regional Research Laboratory, Albany). Subject: "Enzyme Inactivation in Fruit Purees."

Lowe, Edison, and Howes, John (U. S. D. A. Western Regional Research Laboratory, Albany). Subject: "An Improved Hot Thermocouple Anemometer for Measuring Velocities in Air-Blast Freezers."

National Technical Laboratories, South Pasadena, California. Subject: "Instrumentation."

The following three national members have been admitted to membership in the Northern California Section: Henry C. Strecker (Beech-Nut Packing Co.), Dr. John McConnell (National Canners Association), and Samuel Rogers (Campbell Soup Co.). The following were approved as new members of the Section: Jack L. Ricard (Campbell Soup Co.), L. Richard Liebnach (W. R. R. L.), Valentine C. Van Duzer, Jr. (Wm. Stange Co.), Dr. Harold S. Olcott (W. R. R. L.), John W. Loehler (Pfaudler Sales Co.), and Mrs. Juracy Tejo (Division of Food Technology, University of California).

Publication of the second national issue of the *Hornblower* has been postponed until January, 1949.

Paul C. Wilbur, Vice-President and Director of Research of the Food Machinery Corporation, San Jose, has been to Belgium and other cities in Europe, flying both ways.

Professor Gordon MacKinney, of the Food Technology Division, University of California, spent his 1948 summer vacation in Maine and, while there, attended the annual Gordon Research Conferences at New London, New Hampshire, sponsored by the A. A. A. S. At that time he gave information to those interested on some of the researches carried on at the University of California on dried and canned fruits.

NORTHEAST SECTION

On October 20, 1948, members of the Northeast Section heard 15-minute talks by five speakers, each representing a firm manufacturing one or more food packaging materials and each discussing the value of his product for the particular phase of packaging where it has met with widest acceptance. The speakers were:

Hugh Robinson (New England Manager, Anchor Hocking Glass Co.). Subject: "Food Packaging in Glass."

J. M. Parliman (Technical Director, Plax Corporation). Subject: "Polyethelene as a New Packaging Material."

Manley T. Callender (New England Manager, Cellophane Division, E. I. DuPont de Nemours). Subject: "Cellophane and its Use in Food Packaging."

L. I. Hodgdon (Foreign Sales Manager, Pneumatic Scale Corp.). Subject: "Equipment to Perform Packaging Operations."

A motion picture illustrating the packaging of whole eviscerated poultry in Cry-o-vac bags prior to quick freezing was discussed by John Cross of the Cry-o-vac Division, Dewey & Almy Co., Cambridge, Mass.

The meeting was then thrown open to discussion. On the discussion panel, in addition to the speakers mentioned above, were Mr. John Warren (Package and Packaging Consultant for the American Home Products Co., New York City), and Dr. A. S. Levine (University of Massachusetts).

A Membership Drive Committee was appointed, consisting of W. L. Cummings (Chairman), Herbert Ewell, F. A. Warren, A. S. Levine, Hugh Robinson, B. W. Blair, and W. E. Steinacker.

A Hospitality Committee was also appointed consisting of Mary C. Harrigan (Chairman), Jean F. Caul, Florence Dillon, and Elsie A. Wilson.

A Northeast News Committee has been formed, headed by Ernest C. Crocker of A. D. Little, Inc., Cambridge. Individual members and members of the Membership Drive Committee and the Hospitality Committee have been asked to send word to Mr. Crocker whenever a new member is signed up or any other activity of general interest takes place.

On December 2, Professor W. L. Campbell, Head of the Department of Food Technology, M. I. T., gave an interesting talk on "Modern Production Methods for the Processing of Pineapple in Hawaii." He illustrated his talk with a beautiful color and sound film of the Hawaiian Islands, the inhabitants, and the method of processing pineapples there. He also told of his experiences in Hawaii this past summer, when he visited the plants of the Hawaiian Pineapple Co.

Future meetings of the Northeast Section have been planned tentatively for February 3, March 31, and May 14, the latter at the University of Massachusetts in Amherst.

Mr. Robert P. Mears, formerly Vice-Chairman of the Northeast Section, has moved to Michigan. His new address is Northland Dairy, Division of General Foods Corporation, Evart, Michigan. As Treasurer during the National Meeting in Boston in 1947 (which included many miscellaneous jobs), Bob handled a tremendous amount of detail in a remarkably efficient manner. The Northeast Section is losing one of its hardest working members, but the Great Lakes Section will benefit from this loss. Our best wishes to Bob for success in his new activities.

Robert S. Scull, of the Burnham & Morrill Co., Portland, Maine, the senior member of the Northeast Section's Executive Committee, has been appointed Vice-Chairman of the Section to take the place of Mr. Mears. Newton Cole, of the Walter Baker Co., Division of General Foods, has been elected to take Mr. Scull's place on the Executive Committee.

Professor Carl R. Fellers, National I. F. T. Secretary-Treasurer and Head of the Department of Food Technology at the University of Massachusetts, gave the dinner address on October 29, 1948, on the occasion of the Third Annual Conference and Joint Meeting of the Northern and Southern California Sections, in Los Angeles.

For the February 1949 meeting, a program on fisheries topics is being contemplated, with Mr. Joseph Puncochar of the Fish and Wildlife Service as Chairman.

SOUTHERN CALIFORNIA SECTION

At the Joint Meeting and Third Annual Conference of the Southern and Northern California Sections held in Los Angeles in October 1948, papers were presented by the following members of the Southern California Section:

Dr. A. O. Beckman (National Technical Laboratories, Pasadena). Subject: "Instrumentation in Food Technology."

Dr. Henry Borsook (California Institute of Technology, Pasadena). Subject: "Natural and Synthetic Foods."

Dr. Harry J. Deuel, Jr. (University of Southern California). Subject: "Fat Problems in the Food Industry."

The opening and closing remarks at this Conference were made by Dr. Arthur Prater, Chairman of the Southern California Section. Milton E. Powell (Knudsen Creamery Co. of California) and Ernest Geiger acted as discussion leaders for parts of the program. The speakers from the Southern California Section were introduced by A. J. Haagen-Smit (California Institute of Technology), Arthur Cherkin (Don Baxter, Inc., Glendale), and Anthony J. Lorenz (California Fruit Growers Exchange). M. S. Dunn (University of California) served as Chairman of the morning session on October 30.

Miss Margaret M. Haws, formerly Secretary-Treasurer of the Section, has moved from Los Angeles and hence is no longer able to fill the office she has held in this Section. By vote of the Executive Committee, Miss Margaret G. Morehouse has been appointed to fill this office.

On November 17 the Section held an industrial meeting at the Owens-Illinois Glass Company. Mr. Jack Stanfill, Training Director, was in charge of the program. A motion picture "It's in the Bottle" was shown, and afterwards there was a tour of the plant.

ST. LOUIS SECTION

On October 6, 1948, the St. Louis Section held a dinner meeting, at which the speaker was Mr. Frederick L. Deming, Assistant Vice-President of the Federal Reserve Bank of St. Louis. He spoke on "The Place of the Food Industry in the Economy of the St. Louis Area." In his talk he discussed the economic implications of food processing, the quantities and values of raw materials flowing into St. Louis plants, the values of the processed goods, and the place of the food industry in the over-all economy of the St. Louis area.

On November 4, 1948, members of the Section participated in a plant trip to the Chase Candy Co. in St.

(Turn to page 11, following Notes and Letters)

Regional Section News

(Continued from page 10, preceding technical papers)

Louis, one of the largest and most modern candy plants in the country. The trip included visits to several production units, where operations were explained.

NEW YORK SECTION

The New York Section, hosts for the 1951 National I. F. T. Convention, have selected the Hotel New Yorker as the hotel offering the best facilities. The Convention will be held the week of June 24, 1951.

The first meeting of the 1948-49 season was addressed by Dr. Aksel G. Olsen, Manager of Applied Research, General Foods Corporation, who gave his impressions of food technology in the Scandinavian countries.

The November meeting was addressed by Mr. James Peckham, Executive Vice-President of the A. C. Nielson Company, who discussed the topic "Measuring Consumer Sales of Food Products."

At the meeting on January 19 Dr. C. G. King, Scientific Director of the Nutrition Foundation, Inc., will address the group on the subject of "Recent Advances in Nutrition." Dr. H. C. Diehl, National I. F. T. President, promises to attend this meeting.

L. V. Burton, Executive Director of the Packaging Institute, gave a talk on "Wasted Packaging Dollars and How to Save Them" at the general session of the Packaging Institute held in New York City on October 14, 1948.

WESTERN NEW YORK SECTION

On October 30, at an afternoon meeting of the Western New York Section in Lyman Hall, Syracuse University, members heard informative talks by the following speakers:

Gerald A. Fitzgerald (Frozen Food Foundation, Syracuse). Subject: "Standards for Frozen Foods."

S. W. Brown (Marine Division, Carrier Corporation). Subject: "Recent Developments in Cargo Vessel Refrigeration."

A. A. Munter (Birdseye-Snider). Subject: "Methods of Testing Moisture Vapor Permeability of Frozen Food Packages."

Richard Henderson (Syracuse University). Subject: "Possibility of Better Utilization of Food Proteins."

At a subsequent dinner meeting on this same date, Dr. S. C. Prescott, Dean Emeritus of Science at the Massachusetts Institute of Technology, gave an interesting talk on "Implications of Food on History," dealing with the history and spread of the use of coffee.

Richard Henderson was Chairman of the Program Committee and Mrs. Betty Watts was in charge of the dinner arrangements for this meeting.

Officers for the coming year were elected at the October meeting, as follows:

Chairman: John E. Fix, American Can Co., Lincoln Alliance Bank Bldg., Rochester, New York.

Vice-Chairman: Domenic DeFelice, General Foods Corp., Birdseye-Snider, Albion, N. Y.

Secretary-Treasurer: William S. Conway, Jr., Richardson Corporation, 1069 Lyell Avenue, Rochester, N. Y.

Executive Committee: James F. Hale, The Borden Co., Syracuse, N. Y.; Dr. Catherine Personius, Cornell University, Ithaca, N. Y.; E. I. Sexton, The Best Foods, Inc., 54 Fulton St., Buffalo 4, N. Y.

PHILADELPHIA SECTION

On October 14, 1948, the Philadelphia Section met at the Eastern Regional Research Laboratories of the U. S. D. A. in Wyndmoor, Pa. Following a short talk by Dr. P. A. Wells, the Director of the Laboratories, there was a tour of the buildings, when members of the Section had an opportunity to learn what the Government is doing in food research.

On November 11, 1948, a dinner meeting was held in Philadelphia, at which time Mr. Charles R. Scott, Jr., Superintendent of Plant No. 2, SKF Industries, Inc., spoke on "Statistical Methods and Quality."

Future meetings of the Philadelphia Section have been planned for January 13, February 11, March 10, April 15, and May 12, 1949.

Richard B. Tobin, formerly Production Manager of the Deerfield Packing Co., Bridgeton, New Jersey, is now with Aroostook Potato Growers, Inc., Presque Isle, Maine.

MARYLAND SECTION

The Maryland Section convened for their fall meeting on September 17, 1948, at the Stafford Hotel, Baltimore, at which time Mr. James A. Moore, Assistant Superintendent of the American Sugar Refining Company in Baltimore, talked on the subject of "Sugar Refining."

At the October 15 meeting, Mr. F. E. Boland, Technical Director of the Schluderberg-Kurdle Company, discussed "Cured Meats."

The meeting on November 15 started with a luncheon and inspection tour of the Schluderberg-Kurdle Plant (meat packers), at which there was a large attendance. An evening dinner meeting was held on the same date, at the Stafford Hotel, Baltimore, when Dr. Arnold Johnson of the Seal Test Research Laboratories, National Dairies, Long Island, New York, gave a paper on "The Use of Milk Powder in the Baking Industry."

At the December meeting, held in Baltimore, officers for the year 1949 were elected and Dr. A. H. Warth of the Crown, Cork & Seal Company, Baltimore, spoke on "The Use of Waxes in the Food Industry."

PUGET SOUND SECTION

Seattle was the location of the Puget Sound Section's first meeting of the fall season, held on November 6. The Section was highly honored by having as its speaker Dr. Carl R. Fellers, Head of the Department of Food Technology at the University of Massachusetts, Amherst, Mass., and National Secretary-Treasurer of the I. F. T. Dr. Fellers presented an excellent paper on "Laboratory Service in the Food Industry." He preceded this with a highly interesting and educational talk on the affairs of the Institute.

The meeting was followed by a banquet, which honored Dr. Fellers, a former Seattle resident. Dr. Fellers was greeted by many members who were close friends when he was a professor at the University of

Washington and actively associated with the research program of the Local branch of the National Canners Association.

On November 19, a meeting of international nature was held at the Province Newspaper Model Kitchen Auditorium, in Vancouver, British Columbia, Canada.

IOWA SECTION

The petition of a group of food technologists in Ames, Iowa, to be recognized as a Regional Section of I. F. T. was approved at the National I. F. T. Council Meeting in Philadelphia in June 1948. As a result, the following officers were elected:

Chairman: Wayne H. Montgomery, Penick & Ford, Ltd., Inc., Cedar Rapids, Iowa.

Vice-Chairman: Michael H. Taras, C. A. Swanson & Sons, Omaha, Nebraska.

Secretary-Treasurer: Robert G. Tischer, Food Processing Bldg., Iowa State College, Ames, Iowa.

Chairman of Program Committee: Elmer W. Eickelberg, Fairmont Canning Co., Fairmont, Minnesota.

On October 27, 1948, the fourth meeting of the Iowa Section was held at the Food Processing Building at Iowa State College. On this occasion, Dr. Carl R. Fellers, National I. F. T. Secretary-Treasurer, discussed the origin of the National I. F. T., mentioned some of its present activities, and presented the official charter to the Chairman, Wayne Montgomery, thereby installing the Iowa Section officially. The Secretary-Treasurer, Robert Tischer, was authorized to frame the section charter.

At this same meeting the Chairman appointed a Membership Committee consisting of Michael Taras (C. A. Swanson & Sons, Omaha, Nebraska), Chairman, Winston Ogilvy (Bacteriology Department, Iowa State College), and Harry E. Louk (George A. Hormel & Co., Austin, Minnesota).

Ralph S. Goodale (Marshall Canning Co., Marshalltown, Iowa) was appointed to the By-Laws Committee.

George F. Stewart (Poultry Department, Iowa State College) was appointed the first National Councilor of this new regional section and will represent the Section at the forthcoming Council Meeting in Atlantic City in January 1949.

Dr. Fellers was subsequently the guest speaker of the evening. His talk was entitled "Laboratory Service in the Food Industry." He discussed the place of the laboratory, its activities and personnel, in connection with industry and other factors and indicated that those industries that have allocated a reasonable portion of their budget to laboratory functions have profited greatly thereby.

A motion picture entitled "History of Food Processing," provided by H. J. Heinz Co., was shown by E. W. Eickelberg of the Fairmont Canning Company. At the time the meeting began, it was found that no arrangement had been made for a projector. The Section owes a vote of thanks to Dick Forsythe, Iowa State College Poultry Department, for both his headwork and his footwork in getting a projector on the spur of the moment.

Future meetings of the Iowa Section are tentatively planned for Friday evenings in February and April, the exact dates depending on the availability of speakers.

MOHAWK VALLEY SECTION

At the I. F. T. Council Meeting held in Philadelphia in June 1948, a petition of a group of food technologists in the Mohawk Valley Section to be rated as a regional section was approved. Officers of this newly formed section have been elected as follows:

Chairman: A. S. Burhans

Vice-Chairman: L. G. Cox

Secretary-Treasurer: L. L. Bowers

The Mohawk Valley Section plans to hold approximately eight meetings during the year, with the majority of them in Canajoharie during the winter and at other times in Schenectady, Troy, Albany, or Little Falls, New York.

The first fall meeting of the Mohawk Valley Section was held on October 28, 1948, at the Fort Rensselaer Club. Approximately forty members were present, and Albert S. Burhans presided.

The charter for this new section of I. F. T. was presented at this October meeting by Dr. B. E. Proctor, Vice-President of the National I. F. T. Later Dr. Proctor gave a talk on "The Development and Utilization of Electronic Methods in Modern Food Processing."

A colorful sound movie was presented, depicting pineapple operations in the Hawaiian Islands and the recent large-scale production methods of the Hawaiian Pineapple Company.

William A. Brittin, Food Bacteriologist at the Beech-Nut Packing Company in Canajoharie, was elected as the first National Councilor. He will represent the Mohawk Valley Section at the next meeting of the National Council in Atlantic City in January 1949.

RESEARCH IN MILK AND FOOD SANITATION

The Sanitation Study Section, Division of Research Grants and Fellowships of the United States Public Health Service has announced that a symposium will be held in the Auditorium of the United States Department of Commerce, Washington, D. C. on January 26-27, 1949. The subject will be "Recent Research in Milk and Food Sanitation." Current research only will be covered.

On Thursday, January 26th, there will be two meetings, pertaining principally to dairy science, and on Friday, January 27th, there will be two sessions dealing with various phases of the microbiology of foods.

Book Review

COMMERCIAL FRUIT AND VEGETABLE PRODUCTS, 3rd Edition, by W. V. Cruess, Professor of Food Technology and Chemist in the Experiment Station, University of California. McGraw-Hill Book Company, 1948, 906 pages; 6¼ x 9¼ in.; cloth. Price $8.50.

We expect that all food technologists are familiar with the first two editions of this book. The new edition follows the general plan of the others. The fundamental considerations of fruit and vegetable preservation are dealt with in the early chapters. The main part of the book describes methods of preservation: canning, sun drying, dehydration, pickling, fermentation and freezing.

Ten years have elapsed since the second edition was published. In this period advances have been made in many phases of fruit and vegetable processing. The new material in this book, which contains 108 more pages than the previous edition, describes these advances. With the exception of bringing production figures up to date, the use of some new illustrations, and expanded literature citations, little has been changed. Some material has been added to practically every chapter. The chapters dealing with the freezing of fruits and vegetables and the dehydration of vegetables have been considerably enlarged. Substantial additions were also noted in the chapters dealing with packing cases and other packages, unfermented fruit juices, pickles, vitamins, and the processing of canned fruits and vegetables. A chapter on plant sanitation has been added.

The reviewer was irked by one minor feature in the make-up of the book. Some illustrations have been placed with material on which they have no bearing. For instance, he finds a picture of a wine cellar in the chapter on vitamins, and a peach-pitting machine clarifying the chapter on enzymes. Illustrations should not wander. But this does not affect the value of the book. The reviewer believes that this standard work has been improved, and that those concerned with fruit and vegetable preservation will find it valuable, and well worth the price, even though they have the early editions.

HAROLD G. BEATTIE.

SURVEY OF FOOD AND NUTRITION RESEARCH IN THE UNITED STATES. Food and Nutrition Board, National Research Council, 1947, 306 pages. Price $1.00.

This report contains a comprehensive compilation of research pertaining to foods and nutrition in academic, governmental and industrial laboratories. The contents are divided into the following four sections: (1) Research projects classified by subject, (2) List of organizations conducting or supporting food and nutrition research, (3) List of professional personnel engaged in food and nutrition research, and (4) Comprehensive subject index.

Although 162 pages are devoted to the listing of 4086 individual projects in the fields of Physiology, Chemistry, Technology, Economics, Bacteriology and Psychology, the reviewer does not believe that the list is complete. It would be too much to expect commercial laboratories to report every project worked on, especially in the field of technology. Nevertheless, both this list and the subject index are so comprehensive that the book is important to anyone having a need for locating what laboratories may be engaged in research on any specific subject.

The book includes an alphabetical list of about 5000 persons connected with the researches listed and provides a key for linking these names with the separate list of 606 contributing organizations. The reviewer believes this book to be a worth-while addition to the reference shelf of most technical libraries, but it will be of only occasional use to most food technologists.

AKSEL G. OLSEN.

Selected Abstracts

ANALYTICAL METHODS

1I. Estimation of ascorbic acid in food preparations.

GOLDBLITH, S. A., AND HARRIS, R. S. *Anal. Chem., 20,* 649-51, July, 1948.

The dinitrophenylhydrazine and indophenol methods are equally valid for measuring the ascorbic acid content of garden-fresh vegetables. More than 90% of the ascorbic acid in garden-fresh plant materials studied was in the reduced form. Garden-fresh vegetables, slurried with 4 parts of 0.5% oxalic acid and stored for as long as 2 weeks at room temperature (70-77° F.), may be assayed by the indophenol method to determine the ascorbic acid and dehydroascorbic acid content at the time of assay, and by the dinitrophenylhydrazine method to determine the biologically active ascorbic acid at the time of harvesting. For longer storage times, lower temperatures of storage must be used. The ascorbic acid content of garden-fresh edible plants may be measured in a laboratory remote from the harvest area. Both methods may be employed to establish the freshness of vegetable foods.

2I. Rapid estimation of citrus peel oil. A new turbidimetric method.

BURDICK, E. M., AND ALLEN, J. S. *Anal. Chem., 20,* 539-41 (1948).

A rapid procedure is described for the colorimetric estimation of oils in raw and processed citrus juices. The oil is distilled with acetone and steam to a known volume, an aliquot is diluted, and turbidity is determined. A standardization procedure makes possible correlation of results in terms of the official method of the USDA.

3I. Studies in analytical methods of extracting vitamin A and oil from fishery products.

MIYAUCHI, D., AND SANFORD, F. B. *Comm. Fisheries Rev., 9,* 19-20, Sept., 1947; *Comm. Fish. Abst., 1,* 1, Apr., 1948.

Grayfish livers held at different temperatures were extracted with petroleum ether and by cooking with water. The vitamin A content of the oil extracted with petroleum ether was about 1% higher than for the oil extracted by cooking with water.

4I. Determination of alcohol-insoluble solids and sugar contents of vegetables.

MOYER, J. C., AND HOLGATE, K. C. *Anal. Chem., 20,* 472-4 (1948).

With aid of a Waring blendor and 85% alcohol, sugars are extracted from frozen vegetables. The alcohol-insoluble solids content is determined by filtering the macerate and drying the residue. The alcohol in a small aliquot of the filtrate is evaporated and an aqueous soln. of the residue is clarified by Somogyi's barium hydroxide-zinc sulfate procedure. For estimation of the total sugar content, an aliquot of the clarified extract is inverted with invertase. The sugar content before and after inversions is determined by Nelson's colorimetric method using Somogyi's new copper reagent.

5I. Detection of hidden infestation in wheat.

FRANKENFELD, J. C. *North W. Miller 235,* 4a, July 13, 1948.

A method for detecting this so-called hidden infestation in wheat has been devised, which appears to be both practical and economical. This method consists essentially of treating a sample of wheat with Lugol's iodine solution. The principle involved is that the wheat kernel becomes permeable to the stain at the points where the weevil punctures the seed-coat in feeding or laying its eggs. When the solution is applied to the kernels it penetrates these punctures and stains the adjacent starch particles in the endosperm so that the egg punctures may be easily seen. The characteristic shape of these egg punctures, being quite small and circular, differentiates them from any other injury which the wheat berry might sustain.

6I. On the preservation of starch solution.

SAMUEL, W. A. *Chemist Analyst, 37,* 33, June, 1948.

For ordinary analytical procedures a starch solution with mercuric iodide added to inhibit mold growth may be prepared as follows: Five g. of potato starch and 10 mg. of mercuric iodide are ground in a mortar with 30 ml. of distilled water. This mixture is slowly added with stirring to a liter of boiling distilled water. The boiling is continued for 3 min. After standing overnight, the clear supernatant liquid is removed by decantation. The minute amount of mercuric iodide in the solution does not interfere with its use even in the presence of sulfides or H_2S.

7I. Estimation of water-soluble tannins in cocoa by the cinchonine method.

KAPPELLER, K. *Ztschr. Untersuch. Lebensmittel, 78,* 393-401 (1939); *Nutr. Abst. & Revs., 17,* No. 4167, 848, Apr., 1948.

A gravimetric method is described for the estimation of water-soluble tannins in cocoa by precipitation with cinchonine. The possible sources of error and limitations of the method are discussed. The tannin contents of the fat-free kernels were found to be: Arriba 17 to 18%, Accra 15.3%.

8I. Estimation of cocoa shell in cocoa powder.

MULLER, A. *Ztschr. Untersuch. Lebensmittel, 78,* 150-6 (1939); *Nutr. Abst. & Revs., 17,* No. 4166, 848, Apr., 1948.

The method is based on the fact that while cocoa powder, unadulterated, is very low in crude fiber, the fiber content of the shell is very high. If the origin of the powder and of the shell is known, it is possible to make an estimation of the added shell from the percentage of fiber in the powder. It is pointed out that cocoa shells from different geographical sources have different fiber contents and hence the factor for calculating shell addition will vary.

9I. Determination of chlorogenic acid in coffee.

MOORES, R. G., MCDERMOTT, D. L., AND WOOD, T. R. *Anal. Chem., 20,* 620-24, July, 1948.

A new method for the rapid and precise determination of chlorogenic acid in green and roasted coffee is based upon the absorption of chlorogenic acid at 324 mμ. The chlorogenic acid is extracted from flaked coffee samples with water, and for green coffee the ultraviolet absorption is measured directly on the extract before and after precipitation of the chlorogenic acid with basic lead acetate. The Slotta and Neisser iodometric oxidation method for chlorogenic acid has been investigated and improved.

10I. On the chemistry of coffee.

HUGHES, E. B. *Chem. and Ind., No. 29,* 462, July 17, 1948.

The principal changes in composition that take place when coffee beans are roasted are loss of water, destruction of sucrose, and partial destruction of the oil, chlorogenic acid, trigonelline, pentosans and other carbohydrates of the cell walls. It is now known that coffee contains no essential oil, but that the volatile oil consists of a mixture of organic compounds, including acetic acid, acetone, acetaldehyde, diacetyl, methyl carbinol, furfural, pyridine, also hydrogen sulphide, these being produced during roasting. It is probable that less volatile substances are involved, for example, phenolic decomposition products of chlorogenic acid, which is a tannin-like constituent of coffee, and condensation products of pheneols and aldehydes. A tarry substance, that is soluble in petroleum ether, is produced by roasting. It has an odor like guaiacol, is soluble in alkali, and is readily oxidized when coffee is allowed to become stale. The staling of coffee is now known to be due not to rancidity of the oil, but probably to the combined effects of volatilization, polymerization, hydrolysis and oxidation of the flavor constituents.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

11I. Browning reaction involving copper-proteins.

THOMPSON, J. B., KOCHER, R. B., AND FRITZCHE, H. W. *Arch. Biochem., 18,* 41-9, July, 1948.

Reactions of copper-protein and certain ring components containing an ethylene group are described. The reactions are accompanied by marked changes in color as well as development of fragrant odors and fluorescence. Proteins can bind copper ion of the oxide possibly through forces existing in the polypeptides. The copper-protein complexes can promote a browning different from known non-enzymatic browning mechanisms.

12I. Glucose-protein reaction in dried egg albumen.

KLINE, R. W., AND STEWART, G. F. *Ind. Eng. Chem., 40,* 919-22 (1948).

These studies were initiated for purposes of elucidating the mechanism of the insolubility and color-deteriorative reactions in dried egg albumen. Results indicate that the initial reaction between glucose and the egg proteins is followed by others which give rise to fluorescence and insolubility. Added amino acids react preferentially with the glucose, although protein insolubility eventually ensues. Replacing the glucose in egg white with other sugars gives results substantiating the theory that the deterioration is of the Maillard type. Hydroxymethylfurfural does not appear to be an intermediate in the deteriorating reactions.

MICROBIOLOGY

13I. Specificity of the response of various assay organisms to nicotinic acid.

VOLCANI, B. E., AND SNELL, E. E. *Proc. Soc. Expt. Biol. & Med., 67,* 511-13, Apr., 1948.

Kynurenine and hydroxyanthranilic acid, intermediates in the conversion of tryptophan to nicotinic acid by Neurospora mutants, does not replace or enhance growth response to suboptimal amounts of nicotinic acid for *L. arabinosus, Leuc. mesenteroids, S. faecalis, Proteus vulgaris* and *Torula cremoris.* These organisms can therefore be used for microbiological assay of niacin. The technique and complete amino acid media used is described.

14I. Experimental enterococcal food poisoning in man.

OSLER, A. G., BUCHBINDER, L., AND STEFFEN, G. I. *Proc. Soc. Expt. Biol. & Med., 67,* 456-9 (1948).

An attempt to determine whether *Streptococcus faecalis* can act as a food poisoning agent was made using kittens and human volunteers. Short incubation period was found and 7 of 26 volunteers showed symptoms of acute gastric or intestinal disturbance. Kittens were found to be unsatisfactory.

15I. Studies on enterococcal food poisoning.

DANGLER, G., AND STEFFEN, G. I. *J. Milk and Food Tech., 11,* 242-3, July-Aug., 1948.

Enterococci in food poisoning are as important as staphylococci. Method for determination is described.

NUTRITION

16I. The nutritive value of homogenized milk: a review.
TROUT, G. M. *J. Dairy Sci., 31,* 627-55, Aug., 1948.

A review of the nutritive value of homogenized milk brought forth the following conclusions: The homogeneity of properly homogenized milk assures equal distribution of fat, vitamin A and added vitamin D. Homogenization retards or inhibits copper induced oxidized flavor. The smooth uniform consistency of properly homogenized milk contributes to its palatability. Proper homogenization changes normal hard-curd milk to a soft-curd milk which appears to be digested slightly more easily but neither more quickly nor more completely than hard-curd milk despite a faster stomach-emptying time. Reduction in size of fat globules by homogenization does not increase fat digestibility.

17I. Improving the nutritive value of flour. II. Further studies on the effect of supplementing enriched flour with B-complex vitamins and some observations on the use of 80% extraction flour.
WESTERMAN, B. D., AND TEMPLETON, F. *J. Nutr., 36,* 187-203, Aug., 1948.

Experiments were conducted on albino rats to determine the effect on growth, maintenance, reproduction and length of life of the use of whole wheat, enriched flour, enriched flour supplemented with other B-complex vitamins, and 80% extraction flour in the diets. Whole wheat and enriched flour did not support normal growth and reproduction in the rats when included in the diets as sources of the B-complex vitamins, at either 40 or 60% level. Enriched flour supplemented further with B vitamins supported better growth, maintenance, reproduction and length of life than enriched flour alone. The addition of choline, pyridoxine, and riboflavin to the enriched flour resulted in greater weight gain, than choline and pyridoxine. Choline, pyridoxine and calcium pantothenate resulted in better gains. The addition of choline, pyridoxine, calcium pantothenate, riboflavin and thiamine to enriched flour made good weight gains in the rats but not equal to the stock diet.

18I. The nature of the supplementary value of the proteins in milled corn meal and milled wheat flour with dried food yeasts.
SURE, B. *J. Nutr., 36,* 59-63, July, 1948.

The biological value of milled wheat flour can be increased by the addition of food yeasts and the supplementary value is due to lysine. The supplementary value of food yeasts when added to milled white corn meal is due to lysine and tryptophane.

19I. The supplementary effect between the proteins of a heat-treated soybean meal ("Soma meal") and a South African strain of yellow maize seed ("Eksteen").
MYBURGH, S. J. *Onderstepoort J. Vet. Sci. and Animal Ind., 21,* 301-4 (1947); *Biol. Abst., 22J,* 13, No. 16539, Aug.-Sept., 1948.

The biological values of the maize and soybean meal determined separately were found to be 69.9 and 63.3, respectively. The average biological value for them combined was 73.5, indicating a small supplementary effect. The use of Hubbel salt mixture or Hawk and Oser's did not affect the values secured.

20I. A comparison of the nutritive value of egg proteins and their amino acid content.
HESS, W. C., et al. *Proc. Soc. Expt. Biol. & Med., 67,* 552-6, Apr., 1948.

The difficulty of assaying nutritional values of proteins by analyzing for the essential amino acids is effectively demonstrated by these experiments. Other factors besides the amino acid content play a role in the biological value of proteins. Feeding experiments and analytical data are presented.

21I. Blood test show fish equal to meat in nutrition.
NILSON, H. W., AND WILSON, S. J. *Canner, 107,* 15, Aug. 14, 1948.

Tests conducted at the Fish and Wildlife Service laboratory in College Park, Md. show the effect of a fish diet on the red cell count and hemoglobin value of human blood have proven that fishery foods are the equal of meat. Protein and mineral content of fishery foods is also the equal of meat. Protein and mineral values of all animal foods are probably the same, regardless of species. The recent experiments showed that from 89 to 96% of fishery foods is digestible, while 87 to 90% of beef and chicken is digestible.

22I. The influence of ascorbic acid, sodium ascorbate, calcium ascorbate and orange juice on dental enamel.
RUSKIN, S. L., MERRIEL, A. T., AND RUSKIN, O. *Am. J. Digestive Diseases, 15,* 302-3, Sept., 1948.

Normal drinking of orange juice does not appear to influence the enamel of the teeth except where cavitation has already been produced. Under these circumstances it would appear to be extremely important that all dental cavitation should be promptly filled, particularly in children. The use of ascorbic acid should also be replaced by a neutral salt, such as the sodium or calcium, both of which fail to show any involvement of the dental enamel.

23I. New B vitamin discovery.
FRAENKEL, G. *Sci. N. L., 54,* 62, July 24, 1948.

Discovery of a new vitamin named B_T for the mealworm or *Tenebrio molitor* which requires it for growth and survival has been announced. Although it is not yet known whether the vitamin is required by humans and other animals or insects, it is thought that it may have an anti-anemia effect. Mealworms may prove valuable in anemia studies since they are very sensitive to lack of both folic acid and the new vitamin B_T.

24I. Effect of amino acid deficiency on rat liver before and after partial hepatectomy.
RAPPORT, D., CANZANELLI, A., AND GUILD, R. *Proc. Soc. Expt. Biol. and Med., 68,* 137-9, May, 1948.

Results are in line with findings of Harrison and Lang in that zein, gelatin and gliadin were inadequate for restoration of liver protein following a 48 hr. fast. Partial hepatectomy results in regeneration of the liver to normal size within 10-14 days, nitrogen content of regenerating liver being 2.67% on first day and below normal into second week. Diets containing gelatin and zein as sole source of protein had no effect on total weight and total solids of regenerated liver 96 hours after partial hepatectomy. Nitrogen concentration of regenerated liver of rats on casein diet were only slightly lower than before hepatectomy.

25I. Fat rancidity and biological antioxidants.
BARNES, R. H. *Biol. Antioxidants, Trans. 1st Conf.* 49-55 (1946); *J. Am. Oil Chem. Soc., 25,* 189, May, 1948.

Feeding rancid fat caused a marked depression of the growth rate of rats on purified diets. When the rancid fat was replaced with fresh lard the rats grew normally; other supplements had less effect. The stability of rat body fat was not affected by feeding antioxidants. Feeding tung oil decreased the stability while butterfat gave increased body fat stability. The keeping time (stability) of the body fat of young rats on a vitamin E-deficient diet could be related to the tocopherol content of the fat. By such data it was shown that in such rats α- and β-tocopherol are better deposited than the γ-isomer.

26I. Does glutamic acid have any effect on learning?
STELLAR, E., AND MCELROY, W. D. *Science, 108,* 281-3, Sept. 10, 1948.

There is no effect of excess glutamic acid on the maze-learning ability of the strain of rats tested. It appears that the facilitating effects of glutamic acid on learning that have been reported are not general. Because of the controls, it is not likely that the positive results can be considered some function of the basic diet used, the age of the animals, the type of behavioral test employed, or the dosages of glutamic acid, although variation on any one of these variables could conceivably have affected results obtained in such an experiment. Strain differences remain as the only possible variable that could account for the difference in results between these experiments and that of Zimmerman and Ross. Other negative results with albino rats indicate that the strain difference is not a matter of whether the rats are albino or pigmented, but it is possible that the beneficial effects of glutamic acid might be specific to the Sherman

strain of albino rats. Further experiments will be done in which proline and other compounds metabolically related to glutamic acid will be studied. At this point, however, it must be concluded that there is little evidence for a facilitating effect of excess glutamic acid feeding on the learning ability of the rat.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

27I. The role of starch in bread-staling.

GEDDES, W. F., AND BICE, C. W. *Bibl. Sci. Ind Rep., 9,* 673, PBL 89296, May 21, 1948.

A review and annotated bibliography of the scientific and technological literature in which the following points are treated: why bread-staling is a problem, the meaning of bread-staling methods of evaluating staling, theoretical aspects of starch and its retrogradation, past work contributing staling theories, technology and control of bread-staling, and a suggested program of future research.

28I. Investigations on the influence of l-ascorbic acid and related compounds on the baking quality of flour.

MALTHA, P. R. A., DEVENTER, HOLLAND, AND KLUWER, A. E., 215p. 1946; *Biol. Abst., 22,* No. 5900, Mar., 1948.

The purpose of these studies was to determine whether the isomers of l-ascorbic acid and d-ascorbic acid, as well as d-glucoascorbic acid, oxytetronic acid, and reductic acid, show a similar effect to the improving influence of l-ascorbic acid on the baking quality of flour. No unanimity of opinion exists concerning the manner in which oxidizing agents improve baking quality, whether indirectly by inhibiting the proteolytic enzymes present in dough, or directly by acting upon the gluten proteins. According to both concepts, the oxidation of glutathione is involved. From the viewpoint of the theory of direct action, the oxidized form is unable to bring about inactivation of proteolytic enzymes; according to those who adhere to the theory of direct action, the oxidized glutathione can no longer cause a direct modification of the gluten proteins by reducing their disulfide bridges.

Improving properties were investigated by means of baking tests and extensographic tests. Of all substances investigated, only reductic acid caused an improvement comparable with that of l-ascorbic acid; the effect of the other substances was of little or no importance. Based on these observations, an explanation is proposed for the different effects of the various compounds tested on baking quality. When these compounds are present in the dough, each of them is oxidized, producing the dehydro form of the acids. Only dehydro-l-ascorbic, acid and dehydroreductic acid are capable, however, of oxidizing glutathione, and this reaction takes place rapidly. The remaining substances are not, or only to a very small extent, capable of bringing about glutathione oxidation, and therefore have only a slight influence on the baking quality.

CANNED FOODS

29I. Aluminum cans.

NICKELSEN, D. *Mod. Pack., 21,* 134-7, April, 1948.

A review of the properties, uses, and methods of handling of aluminum food containers as used in Norway. Among the advantages claimed for this type of container are: no blackening of cans, no metallic scent or taste, no solution of detrimental metal in food, easy opening, and lighter weight of cans. Several disadvantages are also noted such as the softness of aluminum which makes special protection in shipping containers necessary. The fact that some foods attack aluminum with the evolution of hydrogen is, in many instances, a distinct disadvantage. The practical storage life of plums in lacquered aluminum cans, for instance, is only about 5 months at 22° C. The use of anodized and/or lacquered can material is preferable in most instances.

30I. Preserving tinned crustacean meat.

GANUCHEAU, J. J. Assignor to Southern Shell Fish Co., Inc. 2,448,970, Sept. 7, 1948.

The method of canning the meat of crabs and other crustaceans which consists in depositing the meat in a can, depositing in the can a regulating mixture of a solution of common salt containing disodium phosphate and citric acid to cover the meat in the can, the mixture having a hydrogen-ion concentration between 4 and 6.5 pH, and thereafter sealing the can and subjecting the same to a sterilizing temperature.

31I. Canned fish of improved palatability and process of preparing same.

SJOSTROM, L. B. Assignor to Arthur D. Little, Inc. 2,446,889, Aug. 19, 1948.

In the preparation of cooked fish packaged in sterilized containers wherein the fish normally develop undesirable flavor during sterilization, the method of improving the flavor of the sterilized fish comprising treating the fish after cooking but before sterilization with a non-toxic edible alkali.

DEHYDRATED FOODS

32I. Dehydration of corn.

SALO, P. W. Assignor to General Mills, Inc. 2,446,162, July 27, 1948.

Process of dehydrating corn which comprises blanching the corn, partially dehydrating the corn, then deforming the corn kernels while at a moisture content within the approximate range of 10 to 30% so as to alter their natural cellular structure without reducing the kernels to a finely divided condition.

33I. Process for drying egg substance and resulting product.

FREY, C. N., AND MILLER, G. E. Assignors to Standard Brands Inc. 2,447,063, Aug. 17, 1948.

A process for drying egg substance which comprises incorporating a propylene ester of a higher fatty acid belonging to the group consisting of lauric, palmitic, stearic and oleic acids with egg substance, and then drying.

34I. The quality, solubility and density of powdered whole milk in relation to some variations in the manufacturing process. 1. Keeping quality.

MANUS, L. J., AND ASHWORTH, U. S. *J. Dairy Sci., 31,* 517-21, July, 1948.

Preheat treatment of milk at 170° F. for 30 min. or 180° F. for 10 min. resulted in powdered milk of good palatability even after storage, air-packed for 10 months at 45° F. Preheat treatment at 170° F. for 10 min. was less effective. Preheat treatment at 160° F. for 30 min. gave powders of poor keeping quality at 45° F. air-packed. Precondensation of milk to 40% solids after preheat treatment gave better powders than milk precondensed to 20% solids. All air-packed powders stored at 100° F. became oxidized in flavor, but powders made from milk preheat-treated at 170° F. for 10 or 30 min. and at 180° F. for 10 min. and precondensed to 40% solids deteriorated in palatability slightly less than those precondensed to 20% solids.

FISH AND SEAFOOD

35I. Keeping time and quality of sea food fillets.

CASTELL, C. H. *Western Fisheries, 35,* 34, 36, Apr., 1948; *Comm. Fisheries Abst., 1,* 19, July, 1948.

At 32° F. most commercial fillets spoil in 9 to 13 days; at 37° to 38° F., this is reduced to 4 to 6 days. The fillets are always heavily contaminated with spoilage bacteria. In order to determine the effect of these bacteria, a series of fillets were cut from codfish in such a way that bacterial contamination was very low. These were stored in sterile glass containers at 38° in parallel with commercially prepared fillets. At 6 days the commercial fillets began to develop typical off odors and their amine values showed that they were rapidly reaching the unpalatable stage .By 9 days they were completely spoiled. Up to 18 days there was no off-odor from any of the carefully prepared fillets. At 19 days, one of the six had a slight "fishy" odor. At 24 days this fillet was badly spoiled and one other had a sour odor. The experiment was terminated at 40 days, and at this time four of the original six fillets had not developed any observable changes in color or odor.

Similar tests were made many times, and when sufficient care was taken, fillets rarely showed any signs of spoilage before

25 or 30 days. It should be mentioned, also, that once or twice daily the fish were removed from storage and examined for the development of spoilage odors. It is very probable that many of those that spoiled did so because of accidental contamination during this handling.

36I. The fish liver oil industry.

BUTLER, C. *Fishery Leaflet 233,* March, 1948; *Comm. Fish. Abst., 1,* 11, July, 1948.

The literature contains many highly technical reports of isolated segments of vitamin oil processing, such as the characteristics of specific vitamin oils, or a method of analysis; but no unified description of the many ramifications of the industry has been available. This report is designed to bring together into one publication the widely scattered information about this relatively young industry. For purposes of this report, the vitamin-bearing materials are divided into two classes: (1) high oil content-low potency, and (2) low oil content-high potency. The processing methods utilized for class 1 are described as (a) steaming, (b) cold flotation, (c) pressure extraction, (d) pressure cooking; processes for class 2 material are described as (a) alkali digestion, (b) enzymatic modification, (c) acid digestion, (d) solvent extraction. The patent literature on processes is reviewed briefly with examples of applications.

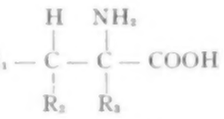
The advantages and disadvantages of the principal methods for the preservation of fish livers such as icing, freezing, salting and chemical preservation are pointed out as they affect the established processing methods.

FLAVORS AND FLAVORING

37I. Imitation maple flavor.

KREMERS, R. E. Assignor to General Foods Corp. *2,446,478,* Aug. 3, 1948.

The process of producing a maple flavor which comprises reacting, at a temperature in the approximate range of 100° C. to 170° C., a reducing saccharide with an amino acid of the general formula



wherein R_1 is H, OH, CH_3, or COOH, R_2 is H or CH_3, and R_3 is H or CH_3, the reaction mixture being in a substantially anhydrous molten state at least at the end of the reaction and the duration of the reaction varying inversely with the temperature and being limited at a given temperature to avoid caramelization masking the maple flavor of the reaction product.

FROZEN FOOD

38I. Frozen homogenized milk. IV. Keeping quality of frozen homogenized milk after thawing.

BABCOCK, C. J. et al. *J. Dairy Sci., 31,* 805-10, Sept., 1948.

The flavors during storage of homogenized milk which has been held in the frozen state and then thawed are similar to those of fresh homogenized milk. Frozen homogenized milk may be held at normal temperatures without deterioration for longer periods than fresh homogenized milk. There is no bacterial problem during storage, and when thawed, compares with fresh homogenized milk.

39I. Frozen homogenized milk. V. Effect of age before freezing on the keeping quality of frozen homogenized milk.

BABCOCK, C. J. et al. *J. Dairy Sci., 31,* 811-15, Sept., 1948.

Homogenized milk should be frozen as quickly as possible after processing, but if the milk is of good quality it may be kept as long as 120 hrs. at 1-67° C. before freezing without adversely affecting the keeping quality of the frozen product.

40I. Cold storage won't "pasteurize" frozen food.

GUNDERSON, M. F., AND ROSE, K. D. *U. S. Egg and Poultry Mag., 54,* 9-11, Sept., 1948.

Pathogenic enteric bacilli are killed rapidly in chicken chow mein stored at — 14° F. during the first five days. After that, the death rate drops off until a more or less resistant bacterial population remains in the product. The normal saprophytic flora appear to be killed less rapidly. In either instance the numbers of bacteria remaining after any given storage period depend primarily on the amount of initial contamination. When this is high even storage for as long as nine months does not assure a low count. Processors of pre-cooked frozen foods cannot reply on prolonged storage to reduce bacterial counts. They must use sanitary production methods in order to turn out products that are bacteriologically acceptable.

FRUIT AND FRUIT JUICES

41I. Prepared fresh McIntosh apple slices.

ESSELEN, W. B., RASMUSSEN, C. L., AND FELLERS, C. R. *Fruit Prod. J., 27,* 276-9, June, 1948.

Various methods were compared for preparing sliced fresh apples for bakery or consumer use in pies. Preliminary treatment in all cases was to hold the slices in 1% brine for ½-2 hrs., rinse and drain. Further treatments were (a) holding slices for 10 min. in sulfur dioxide solutions varying from 100 to 2500 p.p.m. and (b) holding for various times in various concentrations and combinations of acids, sodium benzoate and ascorbic acid with and without 0.1% calcium chloride. In general the 1500 p.p.m. SO_2 was found satisfactory. Soft textured apples should have the addition of 0.1% $CaCl_2$ to the SO_2 solution. Such treatment maintains good quality in the sliced apples for 1-2 weeks at room temperature and for 3 weeks or longer at 35° F.

42I. The use of the tenderometer for the determination of the firmness of apples, peaches, and pears.

LEE, F. A., AND OBERLE, G. D. *Fruit Prod. J., 27,* 244-5, April-May, 1948.

The harvesting of commercial fruits at the proper stage of firmness for market and for processing has long been of interest to people who would prefer to determine the picking time by objective methods. The tenderometer was used on ripening peaches, pears and apples with the object of establishing values to determine the harvesting date of the fruit, and the method appears applicable. The tenderometer was also compared to the pressure tester, using apples in the experiment. Very high correlation indicates that either instrument can be used.

43I. Benzene hexachloride in processed peaches.

DAVIS, L. L. *Food Pack., 24,* 35-6, July, 1948.

Canned peaches from 17 different seedlings and five named varieties, Golden Jubilee, Triogem, Early Hale Haven, Hale Haven and July Elberta, that had received the regular zinc-lead-arsenate-sulfur sprays, except that three pounds of 6% γ-isomer benzene hexachloride per 100 gal. of water was substituted in the regular spray schedule in the "shuck" and "first cover" sprays, were examined organoleptically for evidence of benzene hexachloride. As a check on the tasting panel, a single sample of canned Elberta peaches that had not been sprayed with benzene hexachloride was also included. The tests show that (1) Musty, off-flavor was detected either by taste or smell, or both, by some of the tasting panel, but not by all members, in all samples of canned peaches that had been sprayed with benzene hexachloride. (2) No member of the testing panel reported any musty, bitter or off-flavor in the one sample of canned peaches that had not been sprayed with benzene hexachloride. In fact, the testing panel were led to believe that there might be several samples that had not been sprayed with benzene hexachloride. (3) Benzene hexachloride in water can be detected by smell in one part per ten million, and by taste in one part per million.

44I. Effect of ion-exchange treatment on the stability of apple juice.

CHALLINOR, S. W., KIESER, M. E., AND POLLARD, A. *Nature, 161,* 1023-25, June 26, 1948.

The ion exchange treatment of apple juice seemed to effect the removal or partial removal of nutrients necessary for the growth of microorganisms. Juices so treated become less liable to microbiological spoilage.

45I. The composition of the sugars in Florida Valencia orange juice.

CURL, A. L., AND VELDHUIS, M. K. *Fruit Prod. J., 27,* 342-3, Aug., 1948.

Sucrose and invert sugar are the principal sugars in Florida Valencia concentrated orange juice. These data were obtained through chemical and polarimetric data. In the six samples tested, the sugar content averaged 79% of the total soluble solids, approximately half of total sugar estimated as sucrose, one quarter dextrose, and one quarter levulose.

46I. Vitamin C content of citrus juice concentrates.

ISRAELASHVILI, S., AND FEIGENBAUM, J. *Food Manuf., 23,* 381, Aug., 1948.

The use of pectolytic enzymes, viz. pectinase, in the preparation of high concentrates of citrus juice as suggested by Geer would appear to result in considerable loss of vitamin C, but it was found that this loss could be greatly reduced by special preparation of the juice before concentration. It was found that pasteurized juices lose less than 10% of their vitamin during pectinase treatment and concentration. After reconstitution, which was easily effected, the juice retained the cloudy colloidal appearance which resembled the original natural juice. These results would appear to point to the possibility of practical utilization of pectinase in the production of high citrus juice concentrate with relatively small losses only of vitamin C.

47I. Canned tangerine juice. I. Exploratory packs.

MOORE, E. L. et al. *Fruit Prod. J., 27,* 340-41, Aug., 1948.

Little difference was found in off-flavor developed on storage of the packs pasteurized at 205° and 240° F. Ethyl caffeate was objectionable, and no general agreement was reached as to the value of other antioxidants used. There was no significant difference in flavor between juices when one was deaerated before pasteurizaion and the other not when both were processed by pasteurization, deaeration, deoiling at 240° F., flashing at this temperature into a chamber under 9-11 in. of vacuum and cooking to 190-195° F.

PECTIN—JAMS AND JELLIES

48I. Characterization of tomato pectinesterase.

PITHAWALA, H. R., SAVUR, G. R., AND SREENIVASAN, A. *Arch. Biochem., 17,* 235-48, May, 1948.

Pectinesterase is present in large amounts only in tomato fruit and citrus peel. Activity was determined by estimation of methanol liberated from the pectin. The enzyme is best extracted at pH8 and 0.1M Na_2HPO_4. The concentrate may be obtained by precipitation with 50% ammonium sulfate from a buffer extract above pH7 preceded by discarding initial precipitation with 20% concentration of salt. Activity is a maximum at pH 7.8 and 50° C. for 10 min. reaction time. The enzyme is unstable below pH6.0 and completely inactivated after 30 sec. at 80° C. Effect of cations is to increase the activity markedly at lower pH, little at optimum pH. Undiluted juices may be rapidly clarified by this enzyme.

49I. Pectin studies. III. The nitric acid ester (preliminary).

LAMPITT, L. H. et al. *J. Soc. Chem. Ind., 67,* 101-104 (1948).

A reproducible nitro ester was obtainable from any one sample of pectin. An approximate parallelism was observed between the viscosity values of aqueous solutions of pectin and of acetone solutions of nitro ester. Two methods for nitrogen determination were compared.

POULTRY

50I. The storage of frozen eviscerated poultry.

STEWART, G. F., AND LOWE, B. *Ice & Refrig., 114,* 37-8, June, 1948.

The study shows that eviscerated poultry (excluding giblets) stored for six months at 0° F. or below is generally in good condition if it has been properly protected against dehydration. Beyond this time the product wil show progressive changes in flavor, and more particularly, in texture. Broilers especially begin to develop a texture defect when cooked which is best described as "dry" or "sawdusty." Chicken giblets deteriorate much faster than the rest of the carcass. Of these, the liver changes most rapidly, developing a pronounced bitter flavor and off-color (yellow) in three months at 0° F. Packing the giblets with the rest of the bird is satisfactory only if the poultry is to be stored for very short periods of time (not over 3 months) and then only if stored at 0° F. or lower.

Tight-fitting, moisture-vaporproof packaging is a "must" for eviscerated poultry when it is to be stored for extended periods of time. Tin cans are ideal packages in this respect but are not generally practical except for institutional packs. Aluminum foil (or laminated sheets), Pliofilm, Saran, Tralon, Cryo-Vac and similar types of film make good protection. Wherever these films are used it is necessary to eliminate (so far as is practical) the air pockets and crevices during wrapping.

51I. Eviscerating method and apparatus.

TRELEASE, R. D., AND KOONZ, C. H. Assignors to Swift and Co. 2,448,693, Sept. 7, 1948.

A method for eviscerating poultry carcass comprising the step of cutting a slit in the posterior portion of the carcass, manually removing through the slit a substantial portion of the viscera, particularly the intestines, liver, and gizzard, and thereafter removing by pneumatic suction the lungs, kidneys, testes, ovaries, and other loose vicera not previously manually removed, simultaneously severing while pneumatically removing viscera which is normally not readily separable from other portions of the carcass, and pneumatically cleaning the internal surfaces from which the viscera has been removed.

PHYSICAL CHEMISTRY

52I. On the nature of the interaction between starch and iodine.

STEIN, R. S., AND RUNDLE, R. E. *J. Chem. Phys., 16,* 195-207, March, 1948.

It is postulated that the interaction between starch and iodine in the amylose-iodine complex is of dipolar nature. A model for such dipolar interaction is proposed and the necessity for a cooperative effect is discussed. The interaction energy is calculated as a function of a parameter x and it is shown that this parameter possesses a critical value at which a "condensation" of iodine into the complex occurs. It is demonstrated that it is physically reasonable for this parameter to attain its critical value. It is shown that additional stabilization may occur as a result of the formation of a resonating "polyiodine" chain at high dipolar interaction having a I-I distance and heat of formation which compares favorably with experiment. Application of the theory is made in discussing the stability of the polyvinyl alcohol-iodine complex. The color of these complexes is discussed in terms of the theory.

53I. Starch blue.

TURNER, N. C. *Science, 108,* 302, Sept. 17, 1948.

Using tracer techniques with radioactive iodine it is shown that even though the presence of iodine in starch is necessary for the formation of blue color, its presence is not necessary for the retention of blue color. Starch stained blue with radioactive iodine remained blue after extracting the iodine with solvent. It is suggested that the blue color is a change induced in the starch molecule by iodine acting catalytically in the presence of oxygen.

54I. Photochemical degradation of starch.

PEAT, S. BOURNE, E. J., AND WHELAN, W. J. *Nature, 161,* 762-3, May 15, 1948.

Amylose in dilute solution is degraded by ultra-violet light, all of the carbon eventually appearing as CO_2. The course of the degradation is followed by copper reduction, iodine stain and pH.

55I. A new tool for infra-red studies.

BAILLY, R. *Science, 108,* 143, Aug. 6, 1948.

The image tube developed during the war for use on the sniperscope and snooperscope for night fighting has been adapted for use on a microscope. Materials normally opaque to visible light can be seen readily with infra-red of 9000 A. and new details are seen in specimens prepared for use with visible light. The image tube can also be adapted to refractometers, goniometers and other optical instruments.

Call for Voluntary Research Papers for the 1949 I. F. T. Program to be held in San Francisco, California, July 10-14

Attendance at the National I. F. T. meetings has increased from year to year until in 1948 it passed the thousand mark. Because of this increase it has been necessary to expand the programs and to have several concurrent sessions. Such a plan offers the advantage that those attending the meetings may choose a session of particular interest to them. On the contrary it has the disadvantage that when several programs are held at the same time some members may not find it possible to listen to all the papers of interest to them. This objection, however, is not particularly serious since the better papers will appear in the Journal and will eventually be available to all members.

Since the meetings in 1948 were so successful it is planned to follow the same system and have several concurrent sessions in the 1949 program. The plan is to hold one or two half-day meetings of general interest to the entire membership. In addition, a series of other meetings will be held. One session being organized by Dr. Lloyd Hall will be devoted to papers concerned with production, with a view of appealing to those particularly interested in production. Another session, being organized by Dr. B. E. Proctor, will consist of a series of symposia devoted to specialized subjects. It is also planned to hold a number of less formal round table discussions for those interested in important and highly specialized fields such as citrus products, potato processing, etc. The purpose of these meetings is to bring together individuals in rather restricted but very important fields. Plans for the discussion groups are being formulated by E. M. Mrak. A third session will be an innovation in that it will be devoted entirely to *contributed original research papers.* This session is being organized by Dr. George Stewart. It is in connection with this session that the Program Committee would like to request that members interested in presenting papers dealing with their own research, fill out the attached form and send it to Dr. George Stewart, Iowa State College, Ames, Iowa.

Papers should be prepared and presented in accordance with the style for FOOD TECHNOLOGY. If authors are not familiar with this style, they can obtain a copy of a booklet entitled "Suggestions for Authors" by writing to C. Olin Ball, Editor, FOOD TECHNOLOGY, 408 E. Broadway, Maumee, Ohio.

(See next page for announcement to authors of papers for the program)

Abstract of Paper to be Presented to the Institute of Food Technologists

ATTENTION OF AUTHORS

By action of the Program Committee of the Institute of Food Technologists the following regulations governing the presentation of original research papers are in force:

1. No title will be accepted unless it is accompanied by an abstract. A title is to be sent in only when the author has the intention of presenting the paper.

2. *Length of Abstracts*—The abstract must be short, 250 words or less. Longer abstracts will be shortened by the Chairman of the Program Committee, when time does not permit returning an abstract to the author.

3. *Contents of Abstracts*—An abstract should contain a succinct statement of (1) the problem under investigation, (2) the essential results obtained.

4. *Time for Presentation of Papers*—The time allowed for the presentation of a paper is 25 minutes.

5. *Apparatus*—When an author intends to use any sort of projection apparatus, or requires any special arrangements for the presentation of his paper, the Program Chairman should be so notified at the time of presentation of the abstract so that suitable arrangements may be made. Persons requiring the use of motion picture or projection equipment should state the size.

6. *Time for Submitting Abstracts*—To be included in the program, this abstract must be in the hands of the Chairman of the Program Committee not later than May 1, and earlier submission will be much appreciated. Mail abstracts to Dr. George Stewart, Iowa State College, Ames, Iowa.

7. *Preparation of Manuscript*—Papers should be prepared and ready for consideration for publication in FOOD TECHNOLOGY at the time of presentation.

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

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News of the Institute

MESSAGE FROM THE PRESIDENT OF THE INSTITUTE

San Francisco and the annual Institute Conference on July 10 to 14, 1949—that is, or should be, the objective of every Institute member in his resolutions for the New Year.

For the Institute, the second decade of progress is beginning; for California, the second century of Statehood and advancement from the initial Gold Rush, which focussed attention on the West Coast, is commencing.

"Be a Forty-Niner" is a much-used phrase during these days, but your President would like to urge you to decide now that the Institute Conference gives you the opportunity, unequalled probably for years, to combine vacation and professional interest in a trip to California when the season is best and in a year when the Fiesta spirit is buoyantly present from the Oregon border to the Mexican line and from the Sierras to the Pacific Ocean.

The Conference program with its featured speakers on food problems of the nation and the world, its sessions on production and research, its symposia and subject matter round tables, is replete with matters of interest to every food technologist, regardless of his field of activity. The Exposition, which accompanies the Conference, will doubtless be the largest and most attractive ever conducted by the Institute.

And when the professional day is done and relaxation is desired, no city in America has more to offer in varied entertainment, historical interest and scenic beauty than the City of Saint Francis.

On your return home, if you are interested in the marvels of the evergreen country of the American-Canadian Pacific Northwest or the famed attractions of the Southwest and of Mexico, you need only turn your faces North or South and complete the round trip to your homes.

You'll never forget the trip as a vacation and you'll never forget the Conference and its Exposition as the equal of many fine annual meetings in other parts of the country.

The Institute and its President invite you to "Be a Forty-Niner" and take to the Gold Rush Trail to California and the West next July.

RECOGNITION

Dr. Ellery H. Harvey, past President of the national I. F. T., was awarded the Army-Navy certificate of appreciation "in recognition of outstanding civilian service rendered during World War II," at a joint Army-Navy ceremony held in New York, December 10, 1948.

George R. Cowgill, Professor of Nutrition at Yale University and a national member of I. F. T., received the 1948 Scientific Award of the Grocery Manufacturers of America at their annual meeting in New York City, November 15, 1948. This award was made to Professor Cowgill for "his fundamental contributions to the science of nutrition, particularly his research on the functional role of vitamin B_1, his success as a teacher of young biochemists, and his outstanding editorial work for the *Journal of Nutrition.*"

Paul B. Christensen, Vice-President of the Merchants Refrigerating Company, New York City, and a national member of I. F. T., has been asked to serve in an advisory capacity for the Brazilian government regarding the economic feasibility of constructing a refrigerated warehouse in Brazil. During the latter part of 1948 he spent approximately two months traveling in Brazil to conduct a survey on this project.

Dr. George J. Hucker, national I. F. T. President in 1947-48 and Professor of Bacteriology at the New York State Agricultural Experiment Station, has been made District Governor of Rotary. In this latter capacity he has addressed the Rotarians of Rochester, New York.

DEATH

Anderson Wheeler Ralston, 49, Assistant Director of Research of the Chemical Research and Development Department, Armour & Co., died suddenly on December 5, 1948, of a heart ailment. Dr. Ralston received his Ph.D. degree from Iowa State College in 1927. Since 1931 he had been associated with Armour & Co., where he was concerned primarily with the chemistry of fats, fatty acids, and their derivatives. He had published extensively in technical journals and had been granted over 100 patents. In 1945 he held the Foster Memorial Lectureship at the University of Buffalo and in 1946 was the recipient of the Midwest Award of the St. Louis Section of the American Chemical Society for his outstanding contributions in the field of fatty acid derivatives. His book "Fatty Acids and Their Derivatives," published early in 1948, is a major treatise in the field. He is survived by his widow and one son, to whom the Institute of Food Technologists express their sincere sympathy.

AGENDA FOR JANUARY COUNCIL MEETINGS

The following topics were those proposed for discussion at the Council Meetings held at the Hotel Lafayette in Atlantic City, on January 16. They are printed at this time to let members know what our Council is doing.

1. San Francisco Meeting 1949; Chicago Meeting 1950; New York Meeting 1951; invitation from Great Lakes Regional Section 1952.
2. Need for a new Directory of Members.
3. Change the word "Affiliate" Member to "Associate" Member wherever it appears in the Constitution.
4. Handling of Employment Bureau.
5. Should Secretary obtain approval of officer nominees before their names appear on ballot?
6. Honorary memberships.
7. Status of student and student clubs.
8. Control of editorial policy by Council.
9. Authorize Secretary-Treasurer to purchase record file.
10. Machinery for appointment of editor, publisher, Secretary-Treasurer, etc., at Annual Meetings.
11. Discussion of advertising policy.
12. Discussion of paid Executive Secretary.
13. Policy on foreign branches.
14. Regional Sections and Regional Associates.
15. Constitutional changes.

Regional Section News

CHICAGO SECTION

At the annual business meeting of the Chicago Section held on December 13, 1948, the following announcements were made:

Reorganization of *The Vitalizer* staff has included acceptance of the resignation of Editor Lloyd A. Hall with regret and thanks for a job well done, appointment of Milton E. Parker as Editor, and appointment of A. Adajian as Managing Editor.

As Chairman of the Committee on Incorporation, Byron M. Shinn presented a report of that Committee, recommending that the Section be incorporated as a corporation not for profit and that the by-laws of the Section be revised to comply with the requirements of the "General Not for Profit Corporation Act." A motion was passed empowering Shinn to appoint a committee to suggest rewording of the by-laws to meet the requirements of the Act.

As Business Manager of *The Vitalizer*, Byron Shinn reported that this publication had been self-sustaining throughout the year 1948.

A committee has been appointed to recommend I.F.T. representatives on the C. T. S. C. Inter-Society Press Committee.

The following officers were elected for 1949:

Chairman: C. L. Smith.
Vice-Chairman: R. A. Isker.
Secretary: J. M. Jackson.
Treasurer: G. E. Brissey.
Executive Committee, 1949-50 Term: L. R. Hedrick, W. E. Pearce.
Section Councilors, 1949-50 Term: R. A. Isker, G. C. North, B. M. Shinn.

The Section participated in the first Chicago area Career Conferences for high school students, held on December 28-30 under the sponsorship of the Chicago Technical Societies Council, the Chicago *Sun-Times* newspaper, and the Illinois Institute of Technology. Mr. E. S. Stateler served as counselor and G. E. Brissey, J. M. Jackson and C. L. Smith as session chairmen.

On January 24, the Chicago Section heard an interesting talk by Mr. W. J. Scarlett of Wallace & Tiernan Co. entitled "Chlorination Applied to the Food Industry."

The December, 1948 issue of *The Vitalizer* contains a tribute to the retiring Chairman of the Chicago Section, E. S. Stateler, who has been intimately associated with the growth of the Section and concurrently with the progress of the national organization. He has served as Secretary, Vice-Chairman, Chairman, and Section Councilor of the Section, and in the national organization he has been the head or chairman of the following committees: Editorial, Publicity, Auditing, Public Relations, Budget, Program, and Constitution. His unselfish interest, unlimited energy, and unquestioned devotion have played an important role in the success of the Chicago Section.

In the autumn of 1948 Professor Milton E. Parker addressed the National Baker Supply House Association at the Edgewater Beach Hotel on "The Path to Quality through Product Control."

Robert W. Bates, formerly head of the Research Bakery, Refinery Pilot Plant, and Inedible Products Development Section of Armour & Co., has been promoted to Assistant Director of Development.

Colonel R. A. Isker, wartime Commanding Officer of the Quartermaster Corps Research and Development Laboratory, has been appointed to serve as Secretary of the Associates Food and Container Institute and reports for duty on Tuesdays and Fridays.

Vincent J. Del Giudice of the Bacteriological Research Laboratory, Armour & Co., gave a paper on "The Incidence of Putrefactive Anaerobes in Pork" at a meeting in Peoria. Dr. L. A. Harriman, Chief Bacteriologist, Byron Shinn and Rex Hansen of the Canning Technology and Animal Nutrition Sections, Armour & Co., assisted Vince in getting the facts for the paper.

Byron Shinn spoke before the Blue Island Women's Club on "Facts, Fables, and Foibles about Foods" at one of their 1948 meetings.

NORTHERN CALIFORNIA SECTION

Papers for incorporation of the Section were signed on December 1, 1948, and as of that date the Section became "The Northern California Section, Inc."

In 1947 the plan was inaugurated of having voluntarily contributed papers presented at the annual meeting of the Northern California Section. This plan met with such favorable response that it was followed again for the annual meeting in 1948. Dr. C. R. Stumbo had charge of getting the program together, and fourteen papers were presented.

At the December 1948 meeting, the following officers were elected for 1949:

Chairman: W. Ray Junk, C. & H. Sugar Co., Matson Bldg., San Francisco.
Vice-Chairman: Ernest E. Jacobs, Lyons-Magnus Co., 2545 16th St., San Francisco.
Secretary: R. D. McKirahan, American Can Co., 20th and 3rd Sts., San Francisco.
Treasurer: Robert N. Berry, American Home Foods, Inc., San Jose.
Councilors: E. L. Mitchell, Richmond Chase Co., San Jose; Paul Sharp, Golden State Co., 425 Battery St., San Francisco.
Executive Committee: Maynard Joslyn, Division of Food Technology, University of California, Berkeley; Sherman Leonard, Schuckl & Co., Sunnyvale.

The second hold-over Councilors from 1948 are Emil Mrak and Tom Mansfield (Food Machinery Corp., San Jose). The second hold-over members of the Executive Committee are Glenn Sorber (Western Regional Research Laboratory, Albany, Calif.) and Clifford Smith (Owens-Illinois Glass Co., San Francisco).

In November 1948 the total membership of the Section was over 400.

H. C. Diehl, Director of the Refrigeration Research Foundation, Berkeley, and present national I. F. T. President, has accepted appointment as consultant to the Western Regional Research Laboratory, Albany, California. In this position he will be available for advice and consultation on this Laboratory's food research.

Hobart R. Halloran has been appointed Director of Laboratories for the Poultry Producers of Central California (Petaluma). He is in charge of Feed Quality Control and Nutritional Studies. Formerly he was

Manager of the Feed Products Department of Collett-Week-Nibecker, Inc., San Francisco.

Another national issue of *The Hornblower* is to be published soon after the first of the year, giving members up-to-date information on programs, hotel reservations, and transportation for the 1949 convention in San Francisco.

Tentative meeting dates for the Section in 1949 are: February 17, April 21, June 16, August 18, October 20, and December 1. Any members of the Institute who expect to be in San Francisco on or about these dates and who are willing to give a talk before the Section are asked to write to Ernest E. Jacobs (Lyons-Magnus Inc., 2545 16th St., San Francisco 3) so that space can be provided for them on the program.

NORTHEAST SECTION

At its December meeting, the Section was honored by a visit from Dr. Louis B. Howard, formerly Chief of the Bureau of Agricultural and Industrial Chemistry, U. S. D. A., and now head of the Department of Food Technology, University of Illinois. Dr. Howard was at the time visiting the Departments of Food Technology at M. I. T. and the University of Massachusetts.

The Fisheries Technology Group has found it convenient to meet on the afternoons of the Northeast meetings, a practice that other technical groups might copy.

Dr. Kenneth C. D. Hickman, inventor of the modern molecular still, is now associated with Arthur D. Little, Inc., at Cambridge, as well as with the Eastman Kodak Co. Dr. Hickman will divide his time between Rochester and Cambridge.

Ernest C. Crocker of Arthur D. Little, Inc., was a touring speaker for the American Chemical Society this fall, speaking on "The Chemistry of Flavor." He spoke before A. C. S. Sections in Toledo, Ohio; Detroit, Kalamazoo, Lansing, and Ann Arbor, Michigan; Charleston, W. Va.; Cincinnati, Ohio; and Indianapolis and Terre Haute, Indiana.

Professor William L. Campbell has been appointed Executive Director of the Corporation Committee on Financing Development at the Massachusetts Institute of Technology. The objective of the Financing Development Program is to raise $20,000,000 for new construction, additional endowment, and unrestricted funds for M. I. T.

Meetings of the Northeast Section for early 1949 are planned as follows:

February 3. Fisheries Symposium, under direction of Professor B. E. Proctor.
March 31. Candy Problems, under direction of Newton Cole.
May 14. Amherst meeting, under direction of Professor Carl R. Fellers.

Mr. Mason T. Rogers has a severe case of thrombosis, which will probably confine him to his home for some time to come. His home is at 48 Cedar Road, Belmont, Mass., and we are sure he will be glad to hear from his friends all over the country. Let's see that he does.

SOUTHERN CALIFORNIA SECTION

On December 15, 1948, the Section held a dinner meeting in Los Angeles, following which Dr. Ernest Geiger gave a talk on "Some Physiological Aspects of Nutrition." Dr. Geiger is Director of Research, Van Camp Sea Food Company, and Professor of Experimental Pharmacology and Toxicology at the University of Southern California.

The program calendar of the Section for 1949 is as follows:

January 19. Place: California Consumers Corp., Pasadena. Program: Industrial Meeting. Mr. R. M. Hagen will give a talk on "Frozen Foods," which will be followed by a tour through the plant.
February 16. Place: Rodger Young Auditorium. Speaker: Dr. F. R. Goetzl, Permanente Foundation, Oakland. Subject: "Physiological Aspects of Flavors."
March 16. Place: Rodger Young Auditorium. Speaker: Dr. R. W. Hodgson, University of California, Los Angeles. Subject: "Principal Factors Responsible for the Development and Success of the California Fruit Industry."
April 20. Place: General Mills—Atlantic and Olympic. Program: Industrial Meeting. Talk by Mr. G. W. Hosfield, Pillsbury Mills. Tour through the plant.
May 18. Place: Rodger Young Auditorium. Speaker: Dr. Robert Stewart, Gerbers Products Co., Oakland. Subject: "Baby Foods."

NEW YORK SECTION

Dr. Lawrence Atkin has rejoined Standard Brands, Inc., after having been for several years with the Wallerstein Laboratories.

Meyer Moskowitz, who was formerly connected with the research departments of Corn Products Refining Company and the Doughnut Corporation of America, has become the Eastern Associate of the consulting firm of James F. Walsh and Associates and has his headquarters in New York City.

Thomas H. Derby, formerly with the Maxson Food Systems, Inc., has joined the Market Development Program of the Sylvania Division, American Viscose Corporation, New York.

Herbert S. Madsen, who was formerly Staff Technologist of the New York Headquarters Staff of General Foods' Department of Research and Development, has been transferred to the Bireley Division in Hollywood.

WESTERN NEW YORK SECTION

A new regional section publication appeared in the fall of 1948, entitled *The Activator*. This is the "house organ" of the Western New York Section and a worthy companion of the previously inaugurated section publications *The Hornblower* (Northern California Section) and *The Vitalizer* (Chicago Section). The front cover of *The Activator*, light grey with black lettering, is appropriately decorated with a design, in red, showing a sheaf of wheat, a microscope, and containers of canned and frozen foods.

The first issue of this publication, dated "Fall Issue of 1948," reports on the meeting held on October 30 when Dr. S. C. Prescott, Emeritus Professor of Food Technology at Massachusetts Institute of Technology, was the dinner speaker, contains an article by William Sherman, Secretary of the Association of New York State Canners, on the "History of the Canning Industry in New York State," and gives an account of the food research at the New York State Agricultural Experiment Station. Personal items of interest, a list of the current officers of the Section, and a directory of the

(Continued on page 12, following Selected Abstracts)

Notes and Letters

Role of Monosodium Glutamate in Seasoning

The recent surge of interest in the use of monosodium glutamate in culinary practice may be due to the currently stepped-up production schedules of those companies which for many years were unable to supply the great demand for this seasoning. The compound has since become readily available and several food laboratories, including the Army Quartermaster group, have presented series of studies on the manufacture, processing, taste, and physiology of the free amino acid and its salts. Consequently, a fuller appreciation of the potentialities as well as actual uses of glutamate has become well-established.

The report of Sjöström and Crocker on "The Role of Monosodium Glutamate in the Seasoning of Certain Vegetables" [a] presents a number of tables on the range of useful proportions of monosodium glutamate to be employed for raw, cooked, canned, and frozen vegetables. These authors comment that the naturally occurring glutamate in a number of the vegetables may contribute to the satisfying resultant flavor after cooking, although added glutamate presents a further enhancement.

Analytical studies have shown that the cooking processes (e.g., those listed in Bulletin 26-L, 1946, of the National Canners Association) commonly employed are sufficient to effect a 15-20% hydrolysis of the vegetable proteins present. While the exact amount of glutamic acid released under such conditions has not been determined in all cases, sufficient data have been accumulated to show some correlation between the natural glutamic acid present and the additional amount required to enhance the vegetable taste. The presence of sodium chloride was essential, in all cases, for the establishment of the glutamate effect in the 0.1% range, and where it was purposely omitted, poor correlation could be shown.

[a] Food Technology 2, 317 (1948).

Similar effects were observed with cooked meats and cereals, although, in these cases, the percentage of glutamic acid released was considerably higher. In the studies made upon mammalian musculature, it was observed that the cyclized form of glutamic acid, having no glutamate flavor, also was present after the cooking process. The alpha-pyrrolidone carboxylic acid formed in this manner was extracted from the cooked products with ethyl acetate, yielding but fractional quantities as compared with the free glutamic acid present.

Of the vegetables exhibiting these conditions best, lima beans, peas, corn, and mushrooms proved to be most satisfactory.

An interesting "taste effect" of monosodium glutamate itself was noted when overwhelmingly large quantities were used. For example, when working in the packaging room where glutamate (99.5% minimum) is being sieved or poured from a hopper, an individual will inhale considerable quantities without the least degree of harm even over a period of years. However, at the early stages of exposure to the material, the typical salivation effect is experienced together with a sweet-saltiness. At the end of a working day, under such conditions, the observer will note that a residual sweetness persists with a mild cloying sensation in the pharynx. Very little seasoning was employed by the writer in subsequent meals during the period of exposure to "glutamate atmospheres," and his ability to detect threshold concentrations was considerably diminished. Panel-tasting qualities were promptly restored after a 24-hour period of absence from such atmospheres. This situation of involuntary glutamate ingestion proved also to be an appetite stimulant, since hunger contractions of the stomach were constantly evident during exposures, with the exception of the 2-hour period directly after a normal meal.

H. W. Dorn
Irwin-Neisler Company, Decatur, Illinois

Quality Control in Frozen Poultry [a]

(Condensed)

The poultry industry is a multi-million dollar business. An almost countless number of farms are producing poultry, either for eggs for market, eggs for hatching, or poultry for meat purposes. Thousands of dealers or processors are in the business of buying, selling, dressing, and eviscerating the results of the farm production.

The breeding flock, the hatchery, the grower and the feed manufacturer all have equally important functions and each present several problems for technical research and quality control. For the purpose of this discussion, we will pass over them to the problems that present themselves in the dressing plant, where the live chicken is prepared for market.

From a quality control viewepoint, the operations at a poultry processing plant can be grouped into about five centers of responsibility—feeding, dressing, cooling and packing, eviscerating, and freezing.

Most plants "finish feed" the poultry received at the plant. The feeding period varies from one or two days to as much as ten days, and is determined by the type of poultry being handled and the capacity of the feeding station as compared with the amount dressed daily. The purpose of the "finish feed" is to obtain uniformity of

[a] Presented before the Eighth Annual I. F. T. Convention, Philadelphia, Pa., June 7, 1948.

color of the skin, to facilitate the dressing operation which follows, and if possible, to increase the weight of the birds. Since the final quality is directly affected by this operation, problems are presented in the field of quality control. A few samples would include general sanitation of equipment, the kind of feed used, the length of the feeding period, the advantages of improved lighting and ventilation.

The next opertion has to do with the defeathering or what is commonly called the dressing of the bird. Here, many control problems are presented, a few are as follows: the method of killing and its effect on proper bleeding, the type of scald used to loosen the feathers and the temperatures used in the process, and the effect of mechanical picking equipment on the skin. Many plants dip the birds in hot wax to facilitate the defeathering. This presents problems as to the control of the wax and the temperatures at which it is applied. Each part of the dressing operation has a direct effect on the finished product and, therefore, in this one department, there are many problems that would interest a quality control man.

After the dressing operation, the next step in production has to do with proper cooling, grading, and packing. The poultry received from the dressing step usually have an internal temperature of around 100° F. The importance of proper cooling and the speed at which the body heat is removed probably presents one of the most important problems to the quality control program. Consideration also must be given to sanitation, method of cooling, length of holding after cooling and proper packaging.

A step in the poultry processing industry, which is rapidly increasing in importance, is that of the evisceration and packing of the finished product in a ready-to-cook form. Many eviscerating operations today are carried on in the same plant and take the poultry directly from the dressing operation without any cooling period; others follow the plan of eviscerating after the poultry has been cooled following dressing. A great many eviscerators carry on their operations in separate plants for that purpose only. Some use poultry that has been frozen and stored for various periods and which must pass through a defrosting process. The handling under such conditions greatly increases the need of adequate control methods as, in most cases, the initial dressing, cooling, and freezing have been done in other plants, where safe procedures in all stages of preparation may not have been practiced. A visual inspection may not detect the faulty handling, therefore, the defrosting of the frozen poultry adds many problems in the field of quality control. Aside from the problems just mentioned, the eviscerating operation presents many others as follows: the effect of final quality resulting from immediate evisceration after dressing, as compared with a cooled raw product; the proper method and length of the cooling period; the temperatures and length of safe holding periods of poultry for evisceration after dressing; the sanitation problems in connection with eviscerating equipment and personnel; the effects of washing, draining and drying of the eviscerated bird; and bacteria control.

The problems presented in the control of the freezing of the product are very important. In general practice, two types of poultry must be considered—the dressed, or New York style; and the eviscerated, or ready-to-cook pack. The basic laws or rules of freezing are the same for both and are largely controlled by the equipment at the operating plant. The need for controls to protect quality are many and consist of: packaging studies and their effect on proper freezing; the developing of proper procedures to obtain the best results with existing freezing equipment; the length of the freezing period; and the proper handling while in storage and in transportation.

Other fertile fields for quality control studies are the utilization of by-products of the operation, such as feathers, offal and fertilizer. The poultry industry is fast becoming aware of the real need for technical advice.

T. H. Ramsey
Birds Eye—Snider Division
General Foods Corporation

Book Review

Bergey's Manual of Determinative Bacteriology, 6th Edition, by Robert S. Breed, E. G. D. Murray, and A. Parker Hitchens. The Williams and Wilkins Company, Baltimore, 1529 pages. Price $15.00.

The new edition, the sixth, of the well-known "Bergey's Manual" should be on the reference shelf of those who are concerned with the species identification of cultures isolated from natural sources and those who have other taxonomic problems. The new edition lists the essential morphological and cultural characters of over 1600 species (including 300 new ones) thereby assembling in one volume information concerning more species than is elsewhere easily avilable. The usual bibliographic references to the original literature have been retained (and even extended), thus providing for each group ready references for those who have need for the original reports. The importance of this to the busy laboratory worker is obvious.

The sections entitled "How bacteria are named and identified," and "Rules of nomenclature" have justifiably been retained as well as "A historical survey of classifications." A new feature is the source and habitat index.

In the new edition, the editors have relied to a large extent on the advice of a group of specialists each of whom has prepared the material for a particular genus or other taxonomic group with which they were most familiar. Within the framework of the classification outline the number of orders recognized has been reduced to five from seven and the family Corynebacteriaceae has been transferred from Actinomycetales to Eubacteriales. The Beggiatoaceae have been placed in the order Chlamydobacteriales. The new edition recognizes two new groups, the orders Rickettsiales and Virales, which have been placed in a supplement to the outline.

The system of classification which forms the basis of

the manual has not been accepted by all bacteriologists, particularly by those in countries other than the Americas, but without question it is used by more individuals than any other system yet proposed. Since the average worker in food research laboratories is not likely to be concerned with the finer problems of bacterial taxonomy, the present manual can safely be recommended to this group as a standard reference text.

L. S. McCLUNG.

THE CHEMICAL FORMULARY, Vol. VIII, Edited by H. Bennett, Chemical Publishing Co., Inc., 1948, 448 pages. Price $7.00.

This volume, as have the others of the series, contains formulae and recipes for making a wide variety of products and for doing things.

NUTRITION AND DIET THERAPY, 9th Edition, by Fairfax T. Proudfit and Corinne Hodgen Robinson. The Macmillan Co., 1948, 782 pages. Price $4.00.

This is the most recent revision of this standard textbook of dietetics.

EATING FOR HEALTH, by Pearl Lewis. The Macmillan Co., 1948, 121 pages. Price $2.25.

The basic facts of nutrition and food utilization are discussed. Many dietary plans are given as well as information about the character and nutritive value of specific foods.

DANGER! CURVES AHEAD! by Miriam Lincoln, M.D. The Macmillan Co., 1948, 138 pages. Price $2.50.

OVERWEIGHT IS CURABLE, by Wilfred Dorfman, M.D., and E. Doris Johnson, M.S. The Macmillan Co., 1948, 160 pages. Price $2.75.

Both of these books are written by physicians and deal with the disadvantages, causes, effects and treatment of overweight. Corrective diets are given. *Overweight is Curable* contains tables on the composition and caloric content of foods and an extensive bibliography.

Selected Abstracts

ANALYTICAL METHODS

56I. Microdetermination of lead in biological material, with dithizone extraction at high pH.

CHOLAK, J., HUBBARD, D. M., AND BURKEY, R. E. *Anal. Chem., 20,* 671-2 (1948).

The use of a procedure for the quantitative extraction of lead with dithizone at high pH has facilitated the determination of lead in biological material. The high pH extraction step has been incorporated in the final estimation step of the Bambach-Burkey method. The difficulties and advantages of the revised procedure are discussed and analytical data are given to prove the adequate nature of the revised procedure.

57I. On the detection of aluminium by means of aluminon.

VAN NIEUWENBURG, C. J., AND UITENBROEK, G. *Anal. Chim. Acta, 2,* 88-91 (1948).

The well-known reaction of aluminium with aluminon has been modified in such a way as to make it specific for this element. This has been accomplished by adding sulfurous acid beforehand and ethanol and hydrochloric acid afterwards. The first reagent prevents the interference of chromium, indium, gallium, and titanium; the second, those of beryllium, scandium, zirconium and small amounts of ferric iron.

58I. Simple thermometric apparatus for the estimation of carbon monoxide in air.

LINDSLEY, C. H., AND YOE, J. H. *Anal. Chim. Acta, 2,* 127-32 (1948).

A simple, inexpensive apparatus is described for estimating the amount of carbon monoxide in air over a range of concentration from 0.01 to 0.1% or higher, with an accuracy of 0.005 to 0.01%. The carbon monoxide is oxidized by passing through a layer of Hopcalite catalyst at room temperature, and the rise in temperature of the air stream due to the heat of combustions is measured with a thermometer. About 60% of the theoretically possible temperature rise is actually observed with the apparatus. By means of a calibration chart, the concentration of carbon monoxide present is read as a function of the temperature increase.

59I. Volumetric semimicro- and micro-determination of Vitamin B_1.

WACHSMUTH, H. *Bull. Soc. Chim. Belg., 56,* 261-67 (1947); *Analyst, 73,* 461 (1948).

Vitamin B_1 can be determined volumetrically by adding to an alkaline solution an excess of ferricyanide and titrating the excess iodimetrically or directly with ceric sulfate. The process is accurate and takes only 5 minutes. Aldehydes and reducing sugars do not interfere.

60I. Methods for determining decomposition in fishery products.

ALLISON, A. M. *Assoc. Food Drug Off., 12,* 129-39, Oct., 1948.

A review.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

61I. Inhibition of SH enzymes by methyl bromide.

LEWIS, S. E. *Nature, 161,* 692-3 (1948).

Methyl bromide toxicity may be due to its ability to inactivate SH enzymes. In wheat flour fumigated with methyl bromide it was found that the protein fraction of the flour was mainly responsible for the sorption and decomposition of the methyl bromide. It has been shown that when aqueous suspensions of wool, silk, fibroin, collagen, and gelatin are treated with liquid methyl bromide, methylation of carboxyl groups and peptide linkages occur.

62I. Researches on starch. XXXIX. Corn amylose.

MEYER, K. H. et al. *Helv. Chim. Acta, 3,* 108-10, Feb., 1948. (In French).

Corn starch contains a highly polymerized fraction. This is absent in potato starch whose high fraction has a molecular weight of 110,000. Because of this high molecular weight amylose, corn starch paste solidifies more rapidly than potato starch paste. Total fractionation of amylose can be accomplished by successive extractions with water of increasing temperatures. The low polymerized fractions pass into solution first. Corn amylose contains both a high polymer fraction of molecular weight 340,000 and a lower fraction of molecular weight 10,000-50,000. The range of the molecular weights is very wide. Amylose is much less homogeneous than its isomer cellulose.

63I. Studies on the respiration of the white potato. I. Preliminary investigation of the endogenous respiration of potato slices and catechol oxidase activity.

SCHADE, A. L., BERGMANN, L., AND BYER, AVA. *Arch. Biochem., 18,* 85-96 (1948).

Catechol is an unsatisfactory substrate for the elucidation of the enzymatic systems involved in the endogenous respiration of the potato tuber. It inhibits reversibly the catecholase activity of potato tissue while destroying irreversibly the endogenous respiration. Hence, it appears that catechol acts primarily as a cell poison, capable of disrupting completely the normal metabolic processes on which the viability of the cells depends, and only secondarily as a substrate for tyrosinase. The problem remains undecided as to what extent, if any, tyrosinase acts as the terminal oxidase in the endogenous respiration of potatoes.

MICROBIOLOGY

64I. Citric acid. Production by submerged fermentation with Aspergillus niger.

SHU, P., AND JOHNSON, M. J. *Ind. Eng. Chem., 40,* 1202-5 (1948).

Average yields of 72 grams of anhydrous citric acid per 100 grams of added sucrose were obtained by submerged culture of *Aspergillus niger* in shake flasks on a synthetic medium at an initial sucrose concentration of 140 grams per liter. The fermentation required 9 days. A 70% yield was obtained in 12 days at a sucrose concentration of 260 grams per liter. Data on the effect of changes in composition of the medium are presented. The optimal conditions for shake flask fermentations include potassium dihydrogen phosphate above 1 gram per liter, magnesium sulfate heptahydrate above 0.25 gram per liter, iron concentration of 1 mg. per liter, 2.5 grams per liter of ammonium nitrate, and an initial pH between 2.2 and 4.2.

65I. Concentration of cobalt by micro-organisms and its relation to cobalt deficiency in sheep.

TOSIC, J., AND MITCHELL, R. L. *Nature, 162,* 502-4, Sept. 25, 1948.

It appears that, in sheep, the cobalt content of the microbial population of the rumen is related to cobalt concentration in the diet. If cobalt is essential for micro-organisms, but not for the host, then absorption of the element by the host would deprive the micro-organisms of a factor essential for their growth and/or metabolism. It may even be that pining and the other wasting diseases are due to cobalt deficiency of the bacteria, the animal requiring not cobalt, but the bacterial products which have thereby become deficient.

PHYSIOLOGY

66I. Radiation hazards in industry.

WILLIM, C. R. *J. Ind. Hyg. Tox., 30,* 294-99, Sept., 1948.

Radiation hazards in industry, including those of X-ray, low and high voltage, shoe fitting fluoroscopes, radiography, nickel-polonium alloys in sparkplugs, radium-type vacuum gages, self-luminous paints and thorium in gas mantle manufacture, are discussed.

FOOD PRODUCTS

BAKING AND BAKERY PRODUCTS

67I. The effect of shortening stability on commercially produced army ration biscuits. I. Initial data and results of accelerated stability tests.

HORNE, L. W., STEVENS, H. H., AND THOMPSON, J. B. *J. Am. Oil Chem., 25,* 314-18, Sept., 1948.

An experiment involving the commercial production and packaging of two types of Army ration biscuits prepared from common ingredients with nine lots of vegetable oil shortening of increasing stability values and two lots of lard as the only ingredient variables has been described. Accelerated stability tests on both shortenings and biscuit show that: (1) A linear relationship exists between Swift Stability (A. O. M.) and oxygen absorption (Warburg) values obtained on cottonseed oil and soybean oil shortening. (2) Increasing the accelerated stability values of the shortening by additional hydrogenation of the vegetable oils result in greater accelerated stability values for the biscuits containing the corresponding shortenings. A nearly direct relationship was found between the stability of soybean oil shortenings (Swift Stability Values) with the stability of the corresponding biscuits (Rancimeter). In the case of the cottonseed oil shortenings the increase in biscuit stability was marked to about a 100-hour accelerated stability value, but was much less pronounced above 100 hours. (3) Addition of commercial lecithin increased the stability values of the biscuits containing cottonseed oil shortenings, but had an adverse effect on the stability of biscuits containing lard and lard plus N. D. G. A.

68I. Silicone aids bakers.

Modern Plastics, 26, 192, Oct., 1948.

D. C. Pan Glaze (a silicon coating) eliminates the need for greasing pans used in baking bread, buns and other bakery goods. It is claimed that one application will give easy release of bread for 100 to 200 bakings.

COCOA PRODUCTS

69I. The improvement of cacao products by hot water rinses.

D. Sulc. Farm glasnik, 3, 49-55; *Glass Pack., 27,* 709, Sept., 1948.

When cacao beans were rinsed with water at 65° C. and later dried at 70-80° C., the washing was found to have reduced tannins from 4.1 to 1.86% and the acidity from 35.0 to 15.0 cc. N. sodium hydroxide, without altering the moisture, fat, theobromine, starch, albumin, extractable nitrogenous substances or total nitrogen content of the beans. For beans rich in tannins and acids the hot water wash is said to be superior to roasting. The usual bitter, sour, and astringent tastes are reduced to a minimum, and the mild, delicate flavor of the cocoa accentuated. Improved cocoa and chocolate products are possible from the cheaper grades of cacao.

70I. The question of unified designation of coloring substances in cacao: cacao red or cacao purple.

MOSIMANN, G. *Internat. Chocolate Rev., 2,* 111-13 (1947); *Biol. Abst., 22,* No. 11745, 1156, May, 1948.

Fresh beans of the Forastero varieties of cacao contain a purple cyanidin-3-glycoside of glucose or galactose; this glycoside undergoes hydrolysis during fermentation and drying. Catechins and tannins are oxidized to red-brown materials, and a part of the anthocyanin becomes insoluble in alcohol. These coloring matters have variously and inconsistently been called "cacao-red" and "cacao-purple." The history of the terms is discussed.

FATS AND OILS

71I. Studies on rancidity of butterfat.

MUKHERJEE, S., AND GOSWAMI, M. *J. Indian Chem. Soc., 24,* 239-48 (1947); *J. Am. Oil Chem. Soc., 25,* 227 (1948).

Development of rancidity of butterfat on storage with different chemicals has been studied. Effect of hydrogen passed into the butterfat at room temperature has been investigated. The dissolved hydrogen has been found to stop hydrolytic rancidity of butterfat for a period of 5 months and to retard oxidative rancidity to a very great extent. Effects of packaging, pyrogallol, catechol, gallic acid, pyrocatechol, hydroquinol, Na citrate, oxalic acid, coumarin, α-tocopherol, and ascorbic acid were evaluated.

72I. Studies on the heat inactivation of lysine in soy bean oil meal.

EVANS, R. J., AND BUTTS, H. A. *J. Biol. Chem., 175,* 15-20, Aug., 1948.

Soybean oil meal autoclaved 4 hours showed that 40% of the protein lysine and any added lysine was destroyed. Enzymatic digestion *in vitro* freed 60% less lysine from autoclaved protein when compared to unautoclaved; 20% of any added lysine was converted to a form liberated *in vitro* by acid, but not by enzymes. This was traced to sugar occurring in the meal. Soy protein alone when autoclaved showed very little loss of lysine. Added sucrose caused 50% destruction of lysine upon autoclaving. Dry heat was not nearly as effective as autoclaving. Two different ways lysine is inactivated are emphasized: (a) total destruction, (b) change into a form which yields only *in vitro* to acid hydrolysis and resists enzymatic digestion.

73I. Odor and oxidizability.

MONCRIEFF, R. W. *Food Manuf., 23,* 411-13, Sept., 1948.

Gallic acid and its esters are about equal in activity on a molecular basis, and ethyl gallate was the most satisfactory agent to give protection against oxidation without discoloring or imparting a foreign flavor to the fat. As little as 0.005% ethyl gallate in butter fat retarded the development of tallowiness and the loss of carotenoid pigmentation. In the case of lard 0.01% ethyl gallate was effective at 37° C. in inhibiting oxidation, and in the case of refined and deodorized cotton-seed, peanut, and palm oils the same quantity of ethyl gallate had some inhibiting effect at 25° C. Oxidizability can be used as a measure of food deterioration. If certain enzymes can be inactivated, oxidation may be prevented even on exposure to air of such foods as potatoes and apples. But in order to destroy the oxidase by the inactivator it is first necessary to crush or pulp the fruit or vegetable.

FISH AND FISH PRODUCTS

74I. Fish control by refrigeration.

BRENNAN, W. R. *Refrig., Cold Storage and Air Cond., 17,* 29-32; Jan., 1947; *Refrig. Abst., 3,* 138[6], April, 1948.

Three methods of refrigeration are being adapted to the fisheries of Australia: (1) crushed ice for short trips; (2) combined ice and mechanical refrigeration on longer trips; (3) complete mechanical refrigeration on long trips under tropical conditions and with large catches of fish. The advantages of mechanical refrigeration include: comparatively simple and cheap installation; reduces amount of ice necessary for the trip; holds fish over longer period; fish arrive in better condition. A flow diagram of a brine refrigerating system for a tuna clipper is given.

FROZEN FOOD

75I. Effect of fluctuating storage temperatures on quality of frozen foods.

GORTNER, W. A. et al. *Ind. Eng. Chem., 40,* 1423-26, Aug., 1948.

Pork roasts, strawberries, snap beans, and peas were stored for 12 months at 0° F., at 10° F., and in a freezer fluctuating between 0 and 20° F. Palatability, vitamin analyses, and other criteria of food quality were examined periodically. Exposure to the fluctuating temperature resulted in quality changes similar to those occurring at the average temperature. Inference is drawn that temperatures above 0° F. are undesirable.

76I. Effect of rate of freezing on bacterial content of frozen vegetables.

VAN ESELTINE, W. P. et al. *Food Res., 13,* 271-80, July-Aug., 1948.

Peas and whole-kernel corn were frozen very rapidly in liquid air, very slowly at 0° F. packed in insulated boxes, and at two intermediate rates. Freezing in liquid air and in an air blast at — 60° F. resulted in such quick freezing that the bacterial content of the foods was essentially unchanged. Freezing at slower rates allowed multiplication of bacteria before the freezing temperature was reached, but of the increased numbers of bacteria, many were killed by the ordeal of freezing. Freezing in still air at 0° F., a process which can be duplicated in farm or home freezers, seems practical from a bacteriological standpoint. It is essential to package the blanched food and place it in the freezer as quickly as possible to prevent bacterial growth on the food. It is important not to pack the freezer units tightly, as this will result in too-slow freezing of the packages in the center of the stack and bacterial multiplication can be expected to occur. During storage there is a slow death of the bacteria in the frozen state.

77I. The past and the future of the concentration of wine by freezing.

1. DE SEZE, R. R. *General Du Froid. 23,* 13-7, Aug., 1946, and II. 11-6, Oct., 1946; *Refrig. Abst., 3,* 133[3], April, 1948.

The separated ice fraction contains appreciable amounts of alcohol which can be partially recovered by centrifugation. The ice is then used for precooling of further quantities of wine to be concentrated. The elimination of part of the water by freezing increases the concentration of solid particles in the remaining liquid phase to the degree of saturation, thus resulting in the sedimentation of potassium bitartrate and calcium tartrate, and in the coagulation of colloidal substances. Concentration changes affect to some extent the organoleptic properties of wine, producing a boiled taste which is not appreciated by every consumer. These changes can be largely avoided by treatment under vacuum and by moderate grades of concentration. Such a treatment generally results in a marked increase of quality. Twenty references.

FRUIT AND FRUIT JUICES

78I. Processing fruit juices.

SINGLETON, G. 2,450,097, Sept. 28, 1948.

The process of treating fruit juices containing peel oil and acid constituents consisting in raising the temperature of the juice to the boiling point in a closed container under a vacuum sufficient to vaporize the peel oil and acid constituents, passing the vapors through a condenser, filtering the condensate to remove the acids and reintroducing the filtered condensate into the container.

79I. Method for the evaporation and concentration of liquids.

ZAHM, G. G. Assignor to Hurd Corp. 2,450,774, Oct. 5, 1948.

The method of concentrating liquid food products such as fruit juices, beverages, extracts and infusions, which method comprises rapidly flowing the liquid food product in a thin film over a heat exchange surface under high vacuum and thereby separating the liquid food product into a concentrate portion and a vapor portion directly into a first condenser without breaking the vacuum and thereby initially reducing the water content of the flavor-producing constituents, passing the residual vapors directly into a surface condenser without breaking the vacuum and thereby finally condensing substantially all of the residual vapors to form a concentrated liquid fraction containing the flavor producing constituents, and reintroducing the liquid fraction into the concentrate portion thereby restoring to such concentrate portion the flavor producing ingredients originally therein present.

80I. Critical discussion on the Katadyn process, with special reference to its use in the soft drinks industry.

BEGER, H. *Pharmazie, 2,* 359-61 (1947); *Brit. Abst.,* BIII, 218, Aug., 1948.

Experience with the Katadyn process for making H_2O sterile in Berlin during recent years is described. It has worked satisfactorily in spite of the adverse conditions, it is particularly valuable for sterilizing H_2O for mineral-water works, and there is no evidence of poisoning or adverse effect from the presence of Ag in the H_2O. In view of the danger of infection after treatment under present conditions in Berlin it is suggested that mineral-waters should be treated continuously.

PECTIN—JAMS AND JELLIES

81I. Grading pectins.

BAKER, G. L., AND WOODMANSEE, C. W. *Canner, 107,* 18-20, Oct. 16, 1948..

A method of grading approaching a use method should be standardized for the industry. An abridged discussion of popular grading methods is given. Specifically recommended are: (1) the use of a synthetic juice buffer salt solution in the jelly procedure, (2) measurement of the breaking strength rather than the sag of the jelly and (3) a statement by the manufacturer of the optimum pH range of gelation and the methoxyl content of the pectin.

82I. Preservers' stake in uniform pectin grading.

MESCHTER, E. E., AND LATAILLADE, L. J. *Food Pack., 29,* 38, Oct., 1948.

One more method is presented to simplify and employ the good points in all manufacturers' test methods. Tarr-Baker top strength and slice tests were tried as well as the Rigidometers (Western Regional Lab.) and the Ridgelimeter (Cal. Exchange). The latter two gave good agreement. Tarr-Baker methods are very sensitive to rate of application of pressure. Apple pectins came out better on break-strengths while citrus pectins showed better characteristics in rigidity tests. It is suggested that both types of tests be applied. The Rigidometer for rigidity and a modified Stoloff technique for break strength of slices using a dietary scale and reading the pressure required to break the slice.

VEGETABLES

83I. What makes popcorn pop?

Iowa State College Bull. P-54. *Peanut J. and Nut World,* 27, 54-5, Oct., 1948.

Popping expansion is determined by the relative percent and location of hard and soft starch in the kernel and the proper moisture content. Moisture content, the more important of the two, is best at a 12-13%. If the moisture is below 11 or above 14%, popping will be unsatisfactory.

Regional Section News

(Continued from page 6, preceding technical papers)

members of the Section as of September 15, 1948, are also included. An interesting feature is a reproduction of the charter of the Western New York Section, for the benefit of those members who have never seen it.

Our congratulations are extended to the Western New York Section and to its editor, Walter Pheteplace —also to its poet!—for their enterprise in initiating this publication. May the members of the Section cooperate actively with their editor, to make this new venture their own and thus guarantee its success.

W. D. Graham, formerly Chemist for Fanny Farmer Candy Shops, Inc., Rochester, N. Y., is now Chemist for Firmenich & Company, New York City, manufacturers of flavors.

Dr. Willis Gortner has resigned his position of Associate Professor of Biochemistry in the School of Nutrition of Cornell University and has accepted a position as Research Chemist for the Pineapple Research Experiment Station, University of Hawaii, Honolulu, Hawaii.

Frank A. Lee, Associate Professor of Chemistry of the New York State Experiment Station, is a member of the Publicity Committee for the 1949 San Francisco I. F. T. meeting.

Dr. Frank Lee and Dr. Willis Gortner gave a paper entitled "Effect of Freezing Rate on Vegetables" at the 44th Annual Meeting of the American Society of Refrigerating Engineers, Washington, D. C., on December 8.

According to its Directory, the Western New York Section has 173 members, of whom 114 are members also of the national I. F. T.

GREAT LAKES SECTION

The Great Lakes Section will hold its third meeting of the year at 2 p. m. on April 15, at Detroit, Michigan, in the Engineering Society Building. There will be speakers in the afternoon and the evening, officers for the coming year will be elected, and the progress made during the past year will be discussed.

MARYLAND SECTION

At the December 1948 meeting of the Maryland Section the following officers were elected for 1949:

Chairman: Frank Feild, Federal Yeast Corp., Colgate Station,, Baltimore, Md.
Vice-Chairman: Maurice Siegel, Strasburger & Siegel, Baltimore, Md.
Secretary: Joseph Winter, Crosse & Blackwell Co., 6801 Eastern Ave., Baltimore 24, Md.
Treasurer: Edgar Heyl, Products and Process Research, Baltimore, Md.

Dr. A. H. Warth of the Crown Cork & Seal Company continues to serve as Section Councilor for the national Institute for another year.

Clifford F. Evers has become head of the U. S. Fishery Technological Laboratory at College Park, Maryland. He was formerly Technical Director of the National Association of Frozen Food Packers, in Washington, D. C.

PUGET SOUND SECTION

Members of the Puget Sound Section met in Vancouver, British Columbia, Canada, on November 19 and 20, for a joint meeting with the British Columbia Food Technologists' Association. The latter is composed of 74 members, twenty of whom are members of the Institute of Food Technologists.

The first session, held on the evening of November 19, was called to order by Mr. C. Wilson Eddy, Chairman of the Vancouver Association, in the Province Newspaper Model Kitchen Auditorium. Mr. William Lantz, Director of the Domestic Fisheries Experiment Station, Vancouver, B. C., presented a paper on "The Packing Industry." This evening meeting included a social hour and a tour of the Model Kitchen Auditorium, with talks by attendants in charge, explaining the purpose of the demonstration kitchens.

On the morning of November 20, a tour was conducted through the meat packing plant of Canada Packers, Ltd., by Mr. Murry Horton, the firm's Manager and Chief of its Biological Products Division. This was followed by a tour through the laboratories and the plant of the Canadian Fishing Company, Ltd., under the guidance of Mr. Harry R. Beard, the firm's Research Director.

The final tour of the meeting was through the Library, the Chemical Laboratory, and the Chemical-Engineering Laboratory of the University of British Columbia, conducted by Dr. B. A. Eagles, Head of the University's Food Technology and Dairy Divisions.

The successful meeting concluded with a luncheon at the University's Faculty Club.

MOHAWK VALLEY SECTION

Thirty-four members and guests attended the December 16 meeting of the Mohawk Valley Section, held at the Canajoharie Hotel. After a pleasant dinner and a short business meeting, Chairman Allison Burhans introduced the speaker, Dr. Otto A. Faust, pediatrician, who gave an interesting talk on problems in nutrition.

IOWA SECTION

Arrangements are nearing completion for a joint meeting of the Iowa Section of I. F. T. with the local section of the American Chemical Society, at which Ernest C. Crocker of Arthur D. Little, Inc., Cambridge, Mass., will be the principal speaker. Mr. Crocker's lecture tour through the Middle West has made these arrangements possible. The tentative date for the meeting is February 21.

The Iowa Section has compiled a Directory of Members. This Directory, which was mailed at the time of sending out the minutes of the October 1948 meeting, shows that there are sixty-nine members in this Section. Of these, thirty-nine are located in Ames. The remainder are in Clarksville, Muscatine, Waterloo, Reinbeck, Burlington, Marshalltown, Ottumwa, Cedar Rapids, Des Moines, and Storm Lake in Iowa, in Omaha, Nebraska, and in Fairmont and Austin, Minnesota.

A new and specially designed laboratory for research and teaching of food processing and food technology was opened in November 1948 at Iowa State College. Operations at this laboratory are directed by Dr. R. G. Tischer, a member of the Iowa Section.

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employment in a good many companies. All other efforts to improve sanitation can be nullified unless an adequate program of employee education is maintained.

In this discussion of sanitation and fish processing, past and present have been considered, and this paper should be brought to a close with just a glimpse into the possible future. It is very certain that within a reasonable length of time our industry will undergo a drastic change, and when that change occurs, we will find that definite standards have been established for factors which, today, seem intangible. Most technologists in the industry are united in the belief that it is much wiser to develop these standards; actually, we are welcoming the opportunity to do so and a good deal of the technical work in the industry is aimed at just these very problems. For example, which are the organisms that give us the most trouble and what is their resistance to the known germicidal agents? What does an actual bacteria count of 500, 5000 or 5,000,000 on equipment mean with respect to the keeping qualities of our products? How does the presence of germicidal agents incorporated in the ice we use aboard our vessels affect the sanitary characteristics of these vessels and, consequently, the quality of our merchandise? What cleaning methods in use at sea are important toward the maintenance of conditions we desire and how will the addition of chlorine or quarternary compounds to the boat's own supply of water affect these same conditions? How can we ourselves, best inform our customers of those brands and products that represent organizations which are making every effort to continually improve their techniques and, lastly, how can we, ourselves, best inform customers of those brands and products that represent organizations which are content to 'just get by'?

These questions, and these are but a few, represent the challenge which we in the fish processing industry are attempting to meet.

Notes and Letters

Volatile Fruit Concentrates Now Free from Tax

To the Editor, Food Technology:

Because of the active commercial interest in our process for production of volatile fruit concentrates, we have endeavored to keep industry promptly informed of any significant developments which pertain to this subject.

As these volatile fruit concentrates are produced by distillation and generally contain a half percent or more of alcohol, they have been subject to the usual taxes and restrictions on such products. However, on August 17 a bill, H. R. 5270, which exempts volatile fruit concentrates of reasonable alcohol content from certain taxes and other restrictions, was signed by the President and became Public Law 240, 81st Congress. This Act amends subchapter E of chapter 26 of the Internal Revenue Code.

The regulations pertaining to this amendment define the limits of alcohol content and the conditions under which volatile fruit concentrates may be produced and used. These regulations have now been published in the Federal Register of September 27, 1949, pages 5869 to 5879, inclusive. Copies of this issue may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. The regulations became effective on the date of publication in the Federal Register.

Inquiries concerning the new code should be addressed to Mr. Carrol E. Mealey, Deputy Commissioner, Alcohol Tax Unit, Treasury Department, Washington, D. C.

P. A. WELLS, Director
Eastern Regional Research Laboratory
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Oil Chemists Told Latest Developments in Monoester Field

It was recently reported to the American Oil Chemists' Society in Chicago that glyceryl monoesters of fatty acids, widely used during the past decade as baked-goods "improvers" and cosmetic emulsifiers, can now be prepared in much purer and more potent form than has been available in the past. It was announced that the purified distilled "monoglycerides" are now commercially available with a minimum monoester content of 90 percent. This statement is significant in view of the fact that similar mixtures previously on the general market have contained from 30 to 50 percent monoester.

Addition of only 1¼ percent of one of the new distilled "monoglycerides" to the shortening of an experimental sugar-rich "gold" cake batter has a greater effect in increasing the volume of the finished cake than addition of 10 percent of the older type of monoglyceride, although, for best results in texture and other cake properties, full proportions of normal shortening must still be used, it was stated. It is believed that the new product will have at least four times the activity of the older material in other types of cakes and baked goods. Analytical data are: glycerol content, 2.5 percent max.; free fatty acid content (as oleic), 1.0 percent max.; saponification value, 150-160; iodine value, 75-85; color (5¼" Lovibond), 15Y/1.5R max.; M. P., 52° C., 125.6° F. (approx.); specific gravity, .93 at 60° C.

The enhanced properties of the distilled monoesters are primarily due to the high monoester content, but additional benefits are believed due to the absence of diesters, metallic soaps and residual catalyst, and to the low content of glycerol and free fatty acids. Previous commercial methods have been unable to separate all these substances effectively from the surface-active monoesters.

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

News of the Institute

MINUTES OF A COUNCIL MEETING OF INSTITUTE OF FOOD TECHNOLOGISTS

Hotel Lafayette, Atlantic City, N. J.
January 16, 1949

A Council meeting was held on January 16, 1949, at the Hotel Lafayette, Atlantic City, N. J. Twenty-eight Councilors were present. The meeting was called at 2:00 P. M., and presided over by President H. C. Diehl.

Secretary C. R. Fellers, in presenting the Secretary's report, stated that the paid-up membership was 2,625 with about 150 members who have ignored second notices for dues. About one-third of the members chose to pay dues for 1948 only and must be billed for 1949 dues.

As a result of the mail vote of September 20, 1948, all 20 constitutional amendments were approved by the membership. The Secretary's office has furnished stationery for all committees, the President, Editor and Advertising Manager. The office also prepares addressed tabs for mailing "Food Technology," and for the Convention Committee. Data are now being collected for a new directory of members to be distributed about April 1, 1949. Nominating ballots were circulated, and the election ballots will go forward by March 1, 1949.

Good liaison has been maintained with the 15 Regional Sections, and Geographical lists of members have been furnished to IFT Clubs in British Columbia, Oregon, Texas, Louisiana, Georgia, Virginia and North Carolina.

Treasurer Fellers read a Treasurer's progress report, indicating that without counting advertising revenue, there would be only a small balance by the end of the year. This is due largely to the cost of 12 issues of FOOD TECHNOLOGY for 1949.

The books were audited as of June 15, 1948, and found in good order. The Treasurer is bonded. The financial arrangement made in October with Garrard Press for handling non-member subscriptions and back-orders is working smoothly and is saving the Institute considerable money. The University of Massachusetts does not charge the Institute rent, utilities, telephone, mimeograph, or for other service.

The Council authorized the Secretary to purchase a file to cost approximately $50.00; also to proceed with the publication of a membership directory to cost not more than $1,500.00. The cost will be considerably less than this figure.

The Committee on Constitution proposed 58 New Amendments dealing mainly with Student Membership, and the so-called "punitive" article XI, Section 2. The Council approved these Amendments, and also three others submitted earlier, but unintentionally omitted from the last list for a mail vote. The three proposed amendments simplify election procedures and make it possible to mail election ballots four months prior to the Annual Meeting (instead of 7 months). The Council voted to delete all of Article XI, Section 2, and substitute:

> "The Council, by unanimous vote, may terminate Membership in the Institute of any Member, Affiliate or Student Member."

The Insignia and Membership Certificate Committee presented a design similar to that now on the cover of FOOD TECHNOLOGY. The design was approved.

The Committee on Liaison with the Armed Forces reported that the IFT is now recognized as the working organization of food technologists. Excellent relations have been set up with the War Department. A list of Food Technologists, including their training, experience, and specialty will be prepared by the Committee for the War Department. Col. Charles S. Lawrence, President of the Quartermaster Board, U. S. Army, gave a short address pointing out how food technologists can best serve the Armed Services.

The Committee on Qualifications reported that all Associate Members had now been reclassified as either Members or Affiliates in accord with the new Constitution.

The Committee on Organization reported at length on Institute reorganization. They recommended that an Executive Committee of the Council be formed; that the IFT be not incorporated; that divisions by industries like the A.C.S. be not formed; that Regional Section publications should not compete with FOOD TECHNOLOGY for advertising, and that the future of these publications be considered carefully in the light of the general welfare of the Institute. The Committee on Organization also recommended that a paid Executive Secretary be appointed as soon as financial stability is attained, the Council to consider this matter at the time of the Annual Meetings in July 1949. The Council appointed the following Executive Committee to function for the Council until the next Council Meeting: P. K. Bates, A. G. Olson, A. E. Stevenson, E. F. Kohman, W. L. Campbell; C. R. Fellers, ex-officio, and H. C. Diehl, ex-officio. The Council requested the Organization Committee to develop costs, feasibility, location, functions, personnel, and possible savings provided an Executive Secretary's office be set up. The Committee will report at the next Council Meeting.

The California councilors, and Dr. Proctor reported on Annual Meeting plans which are now well advanced. It was announced by President Diehl that the next Council Meeting would be held in San Francisco on Saturday, July 9th, and that there would be a meeting of Regional Section officers on Sunday, July 10th. Numerous symposia, Round Tables, Technical Sessions and trips have been arranged. The membership will be circularized at least three times on the Annual Meeting. The Council approved President Diehl's plea for every councilor to do all he could to assist in the Annual Meeting, including going to San Francisco next July. All papers for the Annual Meetings should be accompanied by abstracts and press releases. Should an author wish to give a paper but publish elsewhere, arrangements may be made with Editor Ball for prompt release of the paper.

The Committee on Publicity for the Annual Meeting made a report showing detailed publicity plans. These were approved in principle by the Council.

The Report of the Committee on Regional Sections reported much interest by various regional clubs which are planning to request affiliation with the Institute. The matter of working out a satisfactory affiliation procedure for foreign groups of food technologists was assigned this Committee. Inquiries have been received from Australia and Sweden. The Council favors the establishment of foreign sections.

The Council took cognizance of the demand for student chapters, and if the Constitutional Amendments carry, such chapters will be authorized in the near future. The cost of student membership cannot be set until the Post Office Department decides whether FOOD TECHNOLOGY can be mailed to a type of membership whose dues are below the actual cost of the journal. Secretary Fellers is investigating this point for the Council.

President Diehl reported the setting up of four Technical Committees, namely:

1. Food Analysis
2. Pectin Standardization
3. Procedures in the Objective Testing of Foods
4. Chemicals in Foods

The Committees and their personnel were approved.

The Council unanimously thanked the Philadelphia Regional Section for a check for $1,732.00 from the last Annual Meeting.

In a discussion of editorial policy it was voted that "The Council favors only the use of generic names of products in the text of FOOD TECHNOLOGY, but it is permitted to further identify manufacturers and products in foot notes." The Council requested the Editorial Board of FOOD TECHNOLOGY to draw up a policy on this subject for consideration at the next Council Meeting.

The Council voted that "The term of office of all appointive officers by the Council is for a period not to exceed one year."

The Publications Committee reported details of the appointment of Harley L. Ward of Chicago as advertising manager of FOOD TECHNOLOGY. Members who are in a position to suggest advertisers are urged to get in touch with Mr. Ward at 360 N. Michigan Ave., Chicago. The Council approved the Committee's action.

The question of honorary and sustaining memberships was referred to the Executive Committee for investigation and later report.

The Council authorized the President to appoint a Chairman of a Committee on Employment. The members of his committee will be the 15 Regional Section Secretaries.

The 1950 Annual Meeting will take place at the Edgewater Beach Hotel in Chicago the third week in May 1950. The 1951 meeting will be at the Hotel New Yorker June 24-27, 1951. The Great Lakes Regional Section presented a tentative invitation for a 1952 meeting. The Council will entertain a formal invitation for the 1952 Annual Meeting in the Great Lakes area.

The Council approved the personnel on the Babcock Award Committee appointed by the President. The Council requested the Secretary to edit these minutes and mail them to the Editor for prompt publication in FOOD TECHNOLOGY.

Adjournment was at 10:45 P.M.

CARL R. FELLERS
Secretary-Treasurer.

1949 CONVENTION IN SAN FRANCISCO

Committee members to assist in the plans for the Convention in July have been appointed, and members are asked to contact these individuals directly on any subject in which they are interested. The committee members are as follows:

General Co-Chairmen: W. Ray Junk (California & Hawaiian Sugar Refining Corp., Ltd., 215 Market St., San Francisco 5, Calif.) and H. T. Griswold (Owens-Illinois Pac. Coast, 500 Sansome St., San Francisco 11, Calif.)

Program Committee: Chairman, Dr. E. M. Mrak (University of California, Berkeley 4, Calif.); Dr. G. F. Stewart (Iowa State College, Ames, Iowa); Dr. B. E. Proctor (Massachusetts Institute of Technology, Cambridge 39, Mass.); Dr. M. S. Joslyn (University of California, Berkeley 4, Calif.); Dr. C. R. Stumbo (Food Machinery Corp., 333 W. Julian St., San Jose, Calif.); and Dr. L. A. Hall (The Griffith Laboratories, Inc., 1415 W. 37th St., Chicago, Ill.).

Arrangements Committee: Chairman, Dr. P. F. Sharp (Golden State Co., 425 Battery St., San Francisco 11, Calif.); W. B. Van Arsdale (Western Regional Research Laboratory, 800 Buchanan St., Albany, Calif.); W. J. Parks (Owens-Illinois Pac. Coast); Dr. A. P. Stewart (Golden State Co.); B. Grossi (Gerber Products Co.); Dr. Leonora Hohl-Strohmaier (University of California); and J. E. McConkie (California Packing Corp.).

Transportation Committee: Chairman, E. E. Jacobs (Lyons-Magnus Co., 2545-16th St., San Francisco 3, Calif.); John B. Shields (Golden State Co., Ltd., 425 Battery St., San Francisco 11, Calif.); L. J. Lataillade (Tea Garden); A. L. Arighi (Hazel Atlas Glass Co., 64 Pine St., San Francisco 11, Calif.); and E. T. Winslow (Spreckels Sugar Co., 2 Pine St., San Francisco 11, Calif.).

Budget and Finance: Chairman, E. L. Mitchell (Richmond Chase Co., 64 W. Santa Clara St., San Jose, Calif.); T. Mansfield (Food Machinery Co., 333 W. Julian St., San Jose, Calif.).

Entertainment Committee: Chairman, R. D. McKirahan (American Can Co., 20th & 3rd Sts., San Francisco 7, Calif.); George Harnik (American Can Co., 20th & 3rd Sts., San Francisco 7, Calif.); and S. J. Leonard (Shuckel & Co., Sunnyvale, Calif.).

Women's Activities: Chairman, Irene McCarthy (Hallmark Testing Service, 4th and Jackson Sts., Oakland, Calif.); Dr. Helen L. Hanson (Western Regional Research Laboratory, Albany, Calif.); and Shirley I. Vollmer, Mrs. George Marsh, and Dr. Vera Mrak.

Field Trips Committee: Chairman, H. M. Pancoast (Food Machinery Corp., 333 W. Julian St., San Jose, Calif.); Prof. W. V. Cruess (University of California, Berkeley 4, Calif.); C. F. Love (Lyons-Magnus Co.);

L. M. Cash (Italian Swiss Colony, Asti, Calif.); J. Kilbuck (University of California); J. R. Matchett (Western Regional Research Laboratory); and E. L. Prudhomme (Richmond Chase Co., San Jose, Calif.).

Publicity and Publications: Chairman, W. S. Richert (Wines and Vines, 717 Market St., San Francisco 3, Calif.); H. E. Jahn (King Sales Co., 210-1st St., San Francisco 5, Calif.); C. R. Havighorst (Food Industries, 210-1st St., San Francisco 5, Calif.); and E. B. Stark (Western Canner and Packer, Miller-Freeman Publications, 121 Second St., San Francisco 5, Calif.).

Exhibits Committee: Chairman, Alan C. Richardson (California Packing Corp., Emeryville, Calif.); C. R. Havighorst (Food Industries, 210-1st St., San Francisco 5, Calif.); T. A. Bruce (Corn Products Refining Co., San Francisco, Calif.); M. Weir (Wallace Tiernan); and N. H. Rosberg (Nels H. Rosberg, Inc., 515 Brannan St., San Francisco 7, Calif.).

It is proposed that the symposia (B. E. Proctor, Chairman) for the Convention deal with

(a) Chemical spray residues in raw materials for processing,

(b) Long distance transportation of perishable foods, and

(c) Wine technology.

Mr. F. L. Lawler, Executive Editor of *Food Industries*, has agreed to organize a round table group on "Advanced Food and Plant Engineering."

On the opening day, July 11, it is planned to have two or three well-known speakers discuss general food problems. Vice-President Hutchison of the University of California has already agreed to participate.

Lloyd A. Hall, in charge of the Industrial and Production Program papers for the annual meeting, has already secured the following speakers (others will be added):

L. E. Slater (Brown Instrument Co., Philadelphia, Pa.): "Problems and Advances in the Control of Heat Exchangers."

A. Katz (F. Ritter & Co., Los Angeles, Calif.): "The Cultivation, Production and Curing of Vanilla Beans in Mexico" (motion pictures).

F. Lerman (Kennedy Extraction Div., The Vulcan Copper & Supply Co., Cincinnati, Ohio).

M. J. Blish, Lucile R. Mac, and M. Louisa Long (International Minerals & Chemical Corp., Amino Acid Div., Rossford, Ohio): "Free Glutamic Acid Content of Fresh, Cooked, and Canned Foods."

S. L. Galvin, A. J. Patten, and L. J. Minor (Huron Milling Co., Harbor Beach, Mich.): "Uses and Potential Applications of Hydrolyzed Vegetable Proteins for Seasoning Foods."

W. H. Cathcart (Atlantic & Pacific Tea Co., New York): (in the baking field).

G. F. Garnatz (Kroger Food Foundation, Cincinnati, Ohio): (in the baking field).

F. P. Mehrlich (Hawaiian Pineapple Co., Honolulu, Hawaii); "Quality Control in Pineapple Canning" (tentative title).

D. G. Heberlein, L. Ptak, S. Medoff, L. E. Clifcorn (Research Dept., Continental Can Co., Chicago, Ill.): "Quality and Nutritive Value of Peas as Affected by Blanching."

C. W. Kaufman and H. A. Campbell (General Foods Corp., New York): "Some Fundamental Considerations in the Processing of Frozen Orange Juice Concentrate."

J. M. Jackson *et al.* (American Can Co., Maywood, Ill.): "Factors Influencing the Processing of Vacuum Packed Whole Grain Corn" and "Effects of Blanching on the Quality and Nutritive Value of Several Vegetables."

Douglas Watson (McKinsey & Co., San Francisco, Calif.): "Controlling Seasonal Pack Cost."

W. J. Finnegan (W. J. Finnegan Co., Los Angeles, Calif.): "The Effect of Expansion on Foods and Containers due to Freezing Action."

P. V. Imes (Carey Salt Co., Hutchinson, Kansas):) "The Production of Salt for Food Use" (tentative title).

Atty. S. A. Moss (Los Angeles, Calif.)): "Food Product Liability."

F. W. Griffith (Griffith Laboratories, Inc., Newark, N. J.): "The Curing of Meat Products."

H. S. Mitchell (Swift & Co., Chicago, Ill.): "The Production of Edible Fats and Oils" (tentative title).

Guy Fox (Vice-President, Armour & Co., Chicago, Ill.).

A. H. Downey (Magnus, Mabee & Reynard, Inc., New York, N. Y.): "Essential Oils, Source, Production, and Increasing Importance in Food Industries."

Gordon Rose (Chief Inspector, Dept. Agriculture, Ottawa, Ontario): "Canadian Food Industries" (tentative title).

To facilitate the sale of booths for exhibits and displays in the Civic Auditorium, which has been reserved for the Convention, and to give the exhibitors a more accurate idea of the space available and the nature of the meeting, a brochure has been printed describing briefly the annual meeting and the exposition accompanying it. Copies of this brochure are available on request. Please see that these are used to advantage.

The Entertainment Committee is planning a Western Rodeo and an outdoor Western Barbecue.

RECOGNITION

Dr. Carl S. Miner, Director of the Miner Laboratories in Chicago, was presented with the 1949 Perkin Medal of the American Section of the Society of Chemical Industry, at a dinner in New York City on January 7, 1949. This high honor is bestowed yearly for outstanding work in applied chemistry. Following the presentation of the medal, Dr. Miner gave an address on "Science Versus Starvation."

Dr. Lloyd A. Hall, Technical Director of The Griffith Laboratories, Inc., Chicago, was elected unanimously to full membership in the University of Illinois Chapter of Sigma Xi on December 13, 1948, in recognition of his outstanding contributions to science, particularly to food chemistry. Initiation took place on January 10, 1949, at the Illinois Memorial Union in Urbana. On this occasion Dr. Hall, speaking not only for himself but for the other successful candidates for Sigma Xi membership, gave an address on "Contributions of Scientists to Social Progress."

The Institute of Food Technologists, of which these gentlemen are both members, extends its heartiest congratulations on these well-merited distinctions.

PROFESSOR CRUESS INJURED

While spending a week-end at his ranch near Danville, California, about the middle of January, Prof. William V. Cruess, of the Division of Food Technology, University of California, I. F. T. President in 1943-44, was painfully injured in a fall from a water tower. Reports are indefinite as to the extent of Prof. Cruess'

(Continued on page 11, following Book Review)

secured during that run. This time is taken as a measure of the stability of vitamin A in the oil examination.

87I. Determination of malt sirup density.

FOSNOT, R. H., AND HAMAN, R. W. *Anal. Chem., 20,* 955-57, Oct., 1948.

The use of the Brabender recording viscometer for the rapid determination of malt sirup densities has been demonstrated. An extensive application of the viscometer in routine control work has shown an accuracy comparable to that obtained with the hydrometer and pycnometer. The application of this method to other types of sirup has been indicated.

BIOLOGICAL SCIENCES

MICROBIOLOGY

88I. Studies on the microflora of flour.

JAMES, N., AND SMITH, K. N. *Canadian J. Res., 26C,* 479-84, Oct., 1948.

Bacteria and fungi, each cultured on appropriate media at 25° C., were found to constitute the major groups of organisms in five brands of commercial flour. Numbers of these organisms showed the same trend in relation to brands and the difference between brands was found to be significant. In addition, these brands harbored mesophilic acid-producing bacteria, thermophilic flat-sour spores, anaerobic thermophilic spores, spores of rope-producing bacteria and yeasts. Numbers of organisms in the latter groups did not show a consistent relationship to brands. The usual method for determining spores of rope-producing bacteria proved to be inadequate for obtaining counts of spores of species known to produce rope in bread. Replication of sampling and careful laboratory procedures were found to be necessary for obtaining reliable estitmates of any population in flour.

89I. Observations on the new statutory methylene blue test for heat treated milk.

DAVIS, J. G., AND WATSON, D. W. *Proc. Soc. Appl. Bact. 2,* 81-84 (1946); *Biol. Abst., 22,* No. 14465, 1425 (1948).

The methylene blue test at 37° C. was compared with the methylene blue test at 18° C., phosphatase, coliform and plate count tests. There is close agreement between the results of the half-hour methylene blue test at 37° C. and the 24 hr. methylene blue standard at 18° C. Agreement is also shown between the half-hour methylene blue standard at 37° C. and the coliform test results. The colony count at 37° shows less satisfactory agreement with the half hour methylene blue test at that temperature. Seasonal variation is more marked between the plate count tests and the half hour methylene blue reduction. The majority of samples giving high phosphatase readings also failed the methylene blue test at 18° C. and the coliform test, indicating that faulty plant management is reflected to a considerable extent by these tests.

90I. Germ free animals.

Ind. Bull. No. 2-47, Oct., 1948.

Germ free animals have been raised at Notre Dame University with no bacteria, microorganisms, viruses or spores inside or on the surface of their bodies. The article describes the method of attaining the germ free state and the peculiarities of these animals with regard to growth, diet requirements, etc.

91I. The biological activity of DDT and related compounds.

BROWNING, H. C. et al., *Canadian J. Res., 26D,* 282-300 (1948).

Sixty-eight compounds were examined for insecticidal activity, using *Drosophila melanogaster* as the test insect and the inner sides of glass containers as the test surface. The compounds included series of halogen analogues, reduced compounds, carbinols and their esters, ethanones, diphenylamines, and the gamma isomer of cyclohexane hexachloride. Activity was shown especially by the fluorine analogues and carbinol esters. Some compounds were briefly examined for mammalian toxicity.

The findings of other workers on the more important compounds are discussed and compared with those presently reported. No constant relation could be established between insecticidal activity and mammalian toxicity, or ease of dehydrochlorination. Low oil solubility was associated with low insecticidal potency (four compounds). No clear association of fat solubilizing of toxic properties with particular parts of the molecule was found.

The essentials of an active molecular structure are a two-carbon chain with one para-substituted phenyl ring on carbon 1 and a di-or tri-halogen group on a saturated carbon 2. Steric factors are also important.

92I. The insecticidal activity of DDT and related compounds against different insect species.

BROWNING, H. C., SHAPIRO, S. K., AND DUBRULE, M. *Canadian J. Res., 26D,* 301-6 (1948).

These were tested for contact insecticidal activity against two beetles, a moth, a plant bug, and a cockroach.

Fluoro-DDT showed specificity against the cockroach and carbinol-DDT against the plant bug. Comparisons with the results of earlier testing against *Drosophila melanogaster* justified its use as an indicator species.

NUTRITION

93I. Tryptophan and niacin relations and their implications to human nutrition.

ELVEHJEM, C. A. *J. Am. Diet. Assoc., 24,* 653-7 (1948).

Niacin requirement of the living organism is affected by the amino acid intake, by the kind of carbohydrate, and by the level of fat in the diet.

94I. The effect of cocoa on the utilization of dietary calcium.

MITCHELL, H. H., AND SMITH, J. M. *J. Am. Med. Assoc., 129,* 871-3 (1945).

In the growing rat, cocoa depressed the utilization of Ca in direct proportion to its oxalate content. In man, cocoa even at the tolerance limit of 20-40 gms. did not affect the Ca balance adversely.

95I. Concerning the presence of vitamin A activity in orange peel pigment.

BOOTH, V. H. *Biokhimiia 12,* 21-25 (1948); *Biol. Abst., 22,* 13444 (1948).

An ester of citraurin was extracted from sweet orange peel with a mixture of petroleum ether and acetone. The extract was purified by passage through a mixture of Al_2O_3 and Na_2SO_4. The ester dissolved in oil was fed to vitamin A deficient rats. On the basis of growth rate and liver assay, the ester has less than 10% of the vitamin A activity of B-carotene.

96I. The stability of iodine in iodized rock salt.

DAVIDSON, W. M., AND WATSON, C. J. *Sci. Agric. (Ottawa) 28,* 1-5 (1948); *Biol. Abst., 22,* No. 14115, 1393 (1948).

The stability of iodine in various types of block salt, under various conditions, was investigated. The experiment was designed to simulate pasture and stall conditions, such as would be encountered on a farm. Salt blocks were made up with and without stabilizers and with and without iron oxide. Under summer pasture conditions, all types of salt investigated rapidly lost their iodine content. Under stall conditions the loss of iodine is less rapid and shows fair stability up to 2 months. The use of stabilizers does not prevent losses of I from block salt. Under good storage conditions iodized block salt in cartons and loose iodized salt in glass jars, retains its iodine for long periods, with and without stabilizers.

ENGINEERING

97I. Waste water problems of the Swedish Sugar Corporation and proposals for purification of the waste water from Sabyholm sugar factory.

WENNSTROM, M. *Socker, 4,* 159-82 (1948).

A brief survey is given of the work at raw sugar factories and the waste waters issuing from the manufacturing processes: flume water, wash water, diffusion waste water, press water and sludge lime transport water as well as, finally, tall-tank water. Problems and purification methods given.

98I. Air sterilization by chemical vapors.

JENNINGS, B. H. *Refrig. Res. Found.,* No. 48-11, 5, Nov. 18, 1948.

Triethylene glycol is highly effective in sterilizing air at very low concentrations (0.004 milligram per liter of air)—and at this low level is non-toxic and non-odorous.[1] This aerosol method is reported to have important uses in public health connections, but it is not recommended presently for food storages.

99I. The anion exchange equilibria in an anion exchange resin.
KUNIN, R., AND MYERS, R. J. *J. Am. Chem. Soc., 69,* 2874-8 (1947).

A study has been made of various anion exchange equilibria associated with the anion exchange resin, Amberlite IR4B, a polyamine type designated as acid adsorption, regeneration, and anion interchange. Evidence has been obtained which indicates that all three processes are true anion exchange reactions in which the equilibria for the various anions involved are dependent upon the structure and valance of the anion as well as the ionization constant of the corresponding acid. The order of the exchange "potentials" of the various anions studied was found to be: hydroxide > sulfate > chromate > citrate > tartrate > nitrate > arsenate > phosphate > molybdate > acetate = iodide = bromide > chloride > fluoride.

FOOD PRODUCTS

CEREALS AND GRAINS

100I. Chemical and nutritive changes in stored grain.
ZELENY, L. *Trans. Am. Assoc. Cer. Chem., 6,* 112-25 (1948).

At higher levels of moisture and temperature, enzymatic and respiratory activity increase sharply and chemical changes occur rapidly. During storage, the proteins of grain undergo chemical and physical changes which affect their solubility and decrease their digestibility. These changes, in some instances at least, appear to affect adversely the nutritive value of the grain. The vitamin A of yellow corn is rather unstable, thiamin in grain is fairly stable, and riboflavin, niacin, and other "B" vitamins of grain appear to be quite stable under normal conditions of storage. Of the various chemical changes that occur in grain during storage, the hydrolysis of fats with the resultant increase of free fatty acid content, appears to be one of the most rapid as well as the most easily measured. Fat acidity measurements, therefore, constitute a useful, practical means of estimating the extent of grain deterioration and of detecting incipient deterioration. An extensive bibliography is included.

DEHYDRATED FOOD

101I. Dehydrated animal products. I. Pork and chicken.
PEARCE, J. A. *Food Canada, 8,* 24-7, July, 1948.

Pork can be successfully dehydrated within four hours in a tunnel-tray drier, if it is precooked by methods that markedly reduce its moisture content. A two-stage drying process is desirable: (a) Dry bulb temperature in the first stage; 160° to 180° F. Dried pork can be further reduced in bulk by compression, and difficulties in compression have been overcome by spraying with a small amount of starch solution. It will keep for periods up to one year at 75° F. if the moisture content is kept below 10%. Chicken can be successfully dehydrated in a tunnel-tray drier. To obtain the most desirable products, the drying temperatures should not be higher than 180° F. Dried chicken will keep for about four months at 75° F.

102I. Dehydration of heat-sensitive materials.
SCHWARZ, H. W. *Ind. Eng. Chem., 40,* 2028-33, Nov., 1948.

The pilot plant phases of the development of dry orange juice powder and a dry coffee powder are discussed. Fundamental similarities between these products, as illustrated by drying rates and vapor pressure data, require specialized types of dryers. Furthermore, the economics of drying at pressures below 1 mm. makes it desirable to feed a concentrated solution to the dryer. In the orange juice process, concentration is carried out under vacuum and the concentrate is then dried in semicontinuous vertical dryers. In the coffee process, concentration is obtained during the extraction step, and the concentrate is fed to a continuous belt dryer. As a means of removing water vapor, solid phase ice condensers and liquid phase absorption systems have been tried. Equipment and control design was directed towards easily operated units. Manpower requirements were low, and no particularly complex operations were required.

FROZEN FOOD

103I. Firming strawberries before freezing.
GRAB, E. G., WEGENER, J. B., AND BAER, B. H. *Food Pack., 24,* 39-43, Nov., 1948.

The food Processing Research Unit of TVA investigated means of preventing loss of juice and mushing during thawing of strawberries. Calcium salts were not effective and gave a typical taste. Low methoxyl pectin (Exchange) added to sugar did no good. Pectinates applied in the syrup at 0.2-0.3% by weight of the fruit were helpful on whole berries and very effective on sliced fruits. In some instances drained weights greater than 100% were obtained. The appearance was greatly improved by the non-dulling glaze created. Too high a percentage of low methoxyl pectin resulted in gel formation. Alginates were very erratic in their behavior.

104I. The complete freezing of fish flesh.
MAHADWAN, V., AND CARTER, N. M. *Fisheries Res. Canada Pac., No. 76,* 85-7, Oct., 1948.

During the "critical zone of freezing" (30° to 23° F.) that has been established by other investigators as the temperature range through which fish must be frozen very quickly to avoid undesirable changes, there can be some 20% of the liquid still unfrozen; this has a bearing on the size of ice crystal formation and all that it can imply in relation to "drip" in the eventually thawed product. Five percent of the original liquid content of the cells can still remain unfrozen at 0° F., the highest temperature advisable for holding or transporting frozen fish. The volume of a flesh sample at 32° F. before freezing was carefully compared with the volume of the same sample after it had been frozen to — 15° F., thawed, and brought back again to exactly 32° F., a permanent decrease in volume was experienced. The magnitude of this permanent decrease was rather small (0.075%), but indicated that it might be related to the non-reversible changes known as "denaturation" that can occur in the proteins of fish tissue when it is frozen. There appears to be an interesting opportunity of using this experimental technique for investigating more completely the degree of denaturation caused by different rates of freezing and thawing, and caused by holding samples of frozen fish flesh at different temperatures.

FRUIT

105I. Recovery of hesperidin.
BAIER, W. E. Assignor to California Fruit Growers Exchange. U. S. 2,442,110, May 25, 1948; *Chem. Abst., 42,* 6022* (1948).

Hesperidin (I) is extd. from orange pulp in a novel and inexpensive manner. Ground orange pulp is treated with lime to harden it, after which H_2O and more lime are added to pH 11. When this liquor is recirculated over the hardened pulp I is extracted. The clear liquor containing I is drawn off, acidified with HCl to pH 5.0, and heated to 50°. Crystallization is complete within several hours, after which crystals of I are separated and further purified if so desired. Depectinized pulp may be used, and the extracted hardened pulp can easily be dried for use in animal feed.

PECTINS—JAMS AND JELLIES

106I. Physiochemical properties of karaya gum and locust bean mucilage.
KUBAL, J. V., AND GRALEN, N. *J. Colloid Sci., 3,* 457-71, Oct., 1948.

The molecular properties of two plant gums, Karaya gum and locust bean mucilage, were investigated. Sedimentation and diffusion constants, partial specific volume, and intrinsic viscosity were determined. Molecular weights and frictional ratios are given. The molecular weight of the Karaya gum is about 30 times (9,500,000) that of the locust bean mucilage (310,000) although the viscosities are about the same for the two materials. There must be, therefore, a big difference in molecular shape and behavior with the Karaya gum much more highly solvated than the locust bean mucilage. It is postulated that the locust bean mucilage forms a system of "free-draining" filamentous molecules, whereas the Karaya gum behaves more as matted coils with the solvent immobilized within the coils.

POULTRY

107I. Reduced requirement for the unknown growth factor during the later stages of growth of chickens and turkeys.
BIRD, H. R. et al. *Poultry Sci., 27,* 654 (1948).

Experiments with chickens indicated that meat meal contains considerably less of the unknown growth factor than does fish meal. Apparently the chicken's and turkey's requirements for this factor are less, per unit of feed, during the later than during the early stages of growth.

108I. Fat rancidity in eviscerated poultry. II. The effect of variation in diet on the characteristics of the fat extracted from immature turkeys.

KUMMEROW, F. A., HITE, J., AND KLOXIN, S. *Poultry Sci., 27,* 689-94, Nov., 1948.

The skin tissue of the birds was found to contain more fat and less phospholipid than the gizzard or liver tissue. Furthermore, statistically significant differences between the birds of various groups were noted in the iodine values of the fat extracted from the skin, gizzard and liver tissue. The length of the induction period of the fat extracted from the skin tissue was taken as a criterion of relative stability towards oxidative rancidity. When compared with the control birds, the fat extracted from birds which had been supplemented with linseed oil was least stable, and that from birds which had been supplemented with choline chloride or ethanolamine hydrochloride was most stable. The feeding of cholesterol, the extract of alfalfa leaf meal, or carotene also increased stability.

VEGETABLES

109I. Effect of canning on the ascorbic acid and thiamine in vegetables.

BEDFORD, C. L., AND MCGREGOR, M. A. *J. Am. Diet. Assoc., 24,* 866-9 (1948).

Comparable lots of peas, snap beans, Lima beans, and soybeans were canned with and without blanching. Except for Lima beans, the ascorbic acid retention was significantly greater in the unblanched-canned products than in the blanched-canned products. The canned vegetables contained small amounts of dehydroascorbic acid which did not increase during storage. Thiamine retention was significantly higher in the unblanched-canned peas, Lima beans, and soybeans. The results with snap beans were variable. A good vacuum is required for the retention of ascorbic acid during storage. Thiamine retention was not affected by a low vacuum.

110I. The ascorbic acid content of cabbage.

BRANION, H. D. et al. *J. Am. Diet. Assoc., 24,* 101-4 (1948).

The ascorbic acid content of cabbage varied between varieties, and in the same variety from year to year. Small cabbage tended to have a higher concentration of ascorbic acid than large cabbage. Cabbage, as purchased, usually had its highest concentration of ascorbic acid in the core which is frequently discarded by the housewife. The loss of ascorbic acid as a result of cooking in large quantities, either by boiling or steaming, was about 70%. The loss in small quantity boiling was about 60%. Standing on the steam table after cooking further increased the loss of ascorbic acid. At the end of 2 hr. on the steam table, over 90% of the original ascorbic acid had been lost.

111I. Ascorbic acid and thiamine in fresh and frozen Lima beans and soybeans.

MCGREGOR, M. A., AND BEDFORD, C. L. *J. Am. Diet. Assoc., 24,* 670-2 (1948).

Lima beans lost from 28 to 39% of the reduced ascorbic acid, 55 to 72% dehydroascorbic acid and 45 to 47% thiamine during the scalding and freezing procedures. The reduced ascorbic acid losses were similar for all times of scalding and for all methods of cooling during preparation for freezing. During storage, the losses varied with the greatest losses occurring in those lots scalded for 4 min. The air-cooled, frozen Lima beans when cooked were equal in quality to the water-cooled beans. The soybeans lost 7% of ascorbic acid and 14 to 15% of thiamine during scalding and freezing procedures. There was a 9% loss of reduced ascorbic acid and a 2 to 3% loss of thiamine during freezer-locker storage.

112I. Radio frequency blanching of cut corn and freestone peaches.

SAMUELS, C. E., AND WIEGAND, E. H. *Fruit Prod. J., 28,* 43-4, Oct., 1948.

Blanching experiments were made on cut corn and Elberta peaches, using a radio frequency generator. Grading was done by ascorbic acid determinations and organoleptic tests, using boiling water blanching as controls. Cut corn blanched in an air medium with radio frequency and cooled in a —20° F. air blast for five minutes gave practically no ascorbic acid loss and was equal to boiling water blanched cut corn in flavor and color. Blanching of peaches by radio frequency is effective, but has a deleterious effect on the volatile fruit flavors. It is possible that ultra-high frequencies may inactivate the enzymes without affecting these volatile flavors.

Book Review

FOOD PRODUCTS, Fourth Edition, by Henry C. Sherman, Mitchill Professor Emeritus of Chemistry, Columbia University. The Macmillan Company, 1948, 428 pages. Price $4.80.

Professor Sherman has thoroughly revised this well-known textbook and brought it up to date both in the text and in the long lists of references that appear at the end of each chapter. The book has been reduced in length by about twenty percent largely by omitting tables of food composition and illustrations from the several chapters and the food laws and regulations that were formerly included in the Appendices. One Appendix has been added on the Treatment of Statistical Data. This is a welcome addition that helps to clarify the reliability of values that appear in tables of nutrient composition of foods. The omissions strengthen rather than weaken the value of the book. The book is not a treatise on food technology and many of the illustrations omitted were photographs of machinery and other subjects of technological interest. Instead of the many tables of the earlier editions the reader is referred specifically to government bulletins that give these data and which are frequently revised. Copies of current food laws and regulations are also available from official sources.

The book is divided into fifteen chapters; the first deals with the chief constituents and functions of foods, the second, with principles of control and management, and the last with the best use of food and with food economics. The intervening chapters discuss the principal food groups, namely, dairy products, eggs, meat, poultry, fish, shellfish, grain products, vegetables, fruits, nuts, edible fats and oils, sugars, and food adjuncts, such as salt, spices, flavors, tea, coffee, salad dressings, soft drinks, and yeast. These topics are grouped in twelve chapters largely according to trade relationship. Each chapter has four main parts. In the author's own words these are: "(1) an account of the production of the food in question and its preparation for market . . . , (2) questions of sanitation, inspection, and standards of purity or of conventional market grade, (3) the general composition, mineral content, and vitamin values, and (4) special characteristics, digestibility, nutritive value and place in the diet." The first two parts vary in length in the various chapters and are intended primarily to convey to the reader the effect of production, processing, and handling on the dietary value of the food and not to discuss the problems of the food technologist. This reviewer feels that the discussion is sometimes too brief to accomplish its purpose. For example, the relative merits of fresh, frozen, canned, and dehydrated foods are not treated adequately, and

problems of food spoilage are also somewhat slighted. The general reader will also find the brief treatment of food standards confusing at times. The latter two parts are very thoroughly done and herein lies the chief purpose and value of the book. The subject of food economy from the viewpoint of the individual, the nation, and the world is presented both clearly and thoroughly, and the composition and nutritive values are treated comprehensively.

The book is well manufactured and practically free from typographical errors. A few statements on technological matters are questionable, but these are not serious and will be apparent to the technologist. Some slips in writing are noticeable, for example, skim-milk is not milk serum (p. 151), and hydrogenation is not applied to the preparation of lard itself (p. 316). The treatment of the references is rather casual. Where authors are mentioned in the text, their publications are sometimes found in the list at the end of the chapter and sometimes not. The author intended to indicate this by including a date with the names of the men to whose work he refers, but in several instances, as on pages 216, 240 and 271 the date has been omitted. Several of the authors mentioned in the text are not included in the references (pp. 158, 271, 298, 300) although the reader will sometimes wish to refer to the original papers for further information. This latter situation apparently arose from the omission of older references that appeared in the earlier editions. Several references to technology are included although the omission of Jamieson's book from the edible oil chapter and some others will be noticed.

Food Products will be very valuable to the general reader with some scientific background and to many who are engaged in the food industries, particularly in the fields of management, advertising, and sales. The food technologist will find it an excellent source of general ideas, but not helpful in technological information in his own field as it makes no pretense to instruction in technological detail. IRA D. GARARD.

PROTEINS AND AMINO ACIDS IN NUTRITION, edited by Melville Sahyun, Chemist Consultant, Santa Barbara, California, formerly Vice President and Director of Research, Frederick Stearns & Company, Detroit, Michigan. Reinhold Publishing Corporation, 1948, xvi + 566 pages. Price $7.50.

Dr. Sahyun has selected an eminent group of contributing editors to write the chapters of this book and has maintained the continuity of subject coverage in excellent fashion through personal authorship. With a foreword by Dr. Sahyun and an introduction by Dr. H. B. Lewis, fifteen chapters make up the volume as follows: 1. Proteins in Nutrition (Historical) by Eliot F. Beach. 2. The Biological Utilization of Proteins and Protein Requirements by H. H. Mitchell. 3. Caloric, Vitamin and Mineral Requirements with Particular Reference to Protein Nutrition by Harry J. Deuel, Jr. 4. Economic Aspects of Food Proteins by Lela E. Booker. 5. The Nutritive Aspects of Meat and Meat Products by H. R. Kraybill. 6. The Amino Acid Requirements of Avian Species by H. J. Almquist. 7. The Relation of Hormones to Protein Metabolism by Abraham White. 8. Plasma Proteins and Their Relation to Nutrition by Melville Sahyun. 9. Protein Deficiency and Its Relationship to Nutritional Anemia, Hypoproteinemia, Nutritional Edema and Resistance to Infection by Clarence P. Berg. 10. Protein and Amino Acid Nutrition in Pediatrics and in Pregnancy by S. Z. Levine. 11. Protein Nutrition in Surgical Patients by Charles C. Lund and Stanley M. Levenson. 12. The relation of Fluid and Mineral Balance to Protein Metabolism by William E. Abbott. 13. Proteins as Related to Burns by Alfred Large and Charles G. Johnston. 14. The Protein Nature of Toxins, Antitoxins and Related Substances by Elvin A. Kabat. 15. Protein Nature of Filterable Viruses by Max A. Lauffer.

In addition to these chapters, there are two valuable tables included in the Appendix, consisting of 94 pages. These data have been reprinted from Government U.S.D.A. Circular No. 549 (1940), "Proximate Composition of American Food Materials" and U.S.D.A. Publication No. 572 (1945) "Tables of Food Composition in Terms of Eleven Nutrients."

Perhaps the most significant feature of Dr. Sahyun's book resides in the emphasis which has been placed upon the interrelationships between proteins, amino acids, vitamins, minerals and caloric value. A more detailed chapter on the influence of carbohydrate and fat metabolism might have rounded out the nutritional viewpoint more completely.

The current decade has witnessed a new peak in the appreciation of proteins and amino acids in nutrition and therapeutics. Nevertheless, the overwhelming search for a panacea has resulted in some controversial therapeutic claims that must be clarified in order to hold this class of food substances at the high level of nutritional esteem which early investigators ascribed to it. This book does much to reestablish the significance and specificity of the proteins upon a sound basis despite the controversies which now exist in the comparative interpretations obtained from biological utilization studies on different species.

Another point in this volume's favor is the careful evaluation of experimental data evidenced before conclusions are drawn. For example, Dr. Deuel states, "It would appear that one can no longer consider that the sole function of protein is the building of body tissue." It is interesting to note how strongly this single statement may modify the conventional definition of the nutritional proteins.

The food technologist may be surprised to observe in these pages the position held by the proteins in health and disease—how on the one hand, a pattern of amino acids performs life-giving duties, yet on the other, produces one of the most potent of all toxins known, that of Clostridium botulinum.

While the paper is not of the best grade, the type is clear and legible. The book itself has a sturdy though inexpensive binding. The text is remarkably free of errors and is made readily available to the less intensive reader by a 13-page index prepared by one who must have appreciated how essential a good index is in this busy day and age. The volume is highly recommended for the food technologist, biochemist and nutritionist.

H. W. DORN.

News of the Institute

(Continued from page 6, preceding technical papers)

injury but he is reported to have fractured one or more vertebrae.

The many friends of Prof. Cruess in the I. F. T. will be happy to know that he is improving and the latest report states that he will not be permanently injured, although he will be hospitalized for several weeks after this item appears in print. He is in the Permanente Hospital, Oakland, California and he enjoys hearing from his friends.

I. F. T. MEMBERS SERVE NATIONAL RESEARCH COUNCIL

The following members of I. F. T. have been included in a Committee on Foods of the National Research Council, concerned with Quartermaster problems; M. L. Anson, L. E. Clifcorn, C. A. Elvehjem, C. N. Frey, W. F. Geddes, D. B. Hand, C. G. King, E. M. Mrak, R. C. Newton, B. E. Proctor, T. Rector, and G. F. Stewart.

Dr. B. S. Clark, of the American Can Company, Maywood, Illinois, has been appointed Chairman of the Packing, Packaging, and Preservation Committee, National Research Council Advisory Board on Quartermaster Research and Development.

IN MEMORIAM

Albert Epstein, of Epstein, Reynolds & Harris, Chicago, died of a heart attack in Tel Aviv, Israel, on December 22, 1948. Mr. Epstein was recognized as a leader in the technology of frozen and dried eggs. During the war he was Chairman of the Technical Committee of the National Egg Products Association.

Paul E. Alexander, of the American Can Co., died unexpectedly on January 25, 1949, at the St. Francis Hospital, Lynwood (near Los Angeles), following an operation. He had been associated with the American Can Company in various capacities since 1925. When their laboratory in Los Angeles was opened in 1945, he became the first research representative for Southern California and participated in the post-war expansion of the canning industry in that area. As a member of I. F. T., he served on the Executive Committee of the Northern California Section in 1941-42 and as Secretary-Treasurer in 1943-45. From 1945 to 1948 he was a member of the Executive Committee of the Southern California Section. He was unstinting in his time and effort in all his endeavors, and his integrity and loyalty were outstanding.

The sympathy of the Institute of Food Technologists, of which these men were members, is extended to their families.

Regional Section News

CHICAGO SECTION

The Illinois Institute of Technology has formed a Food Technology Council consisting of leaders in the food industries in the Chicago area and elsewhere, who will serve in an advisory capacity to council its staff in the development of its food technology program. Among those asked to serve on this Council are the following members of the Chicago Section of the Institute of Food Technologists: Roy C. Newton (Chairman), Thomas M. Rector and Victor Conquest (Vice Chairmen), Milton E. Parker (Secretary), Berton S. Clark, George A. Crapple, Albert E. Elder, George Garnatz, Philip P. Gott, Charles E. Gross, Lloyd A. Hall, Lee Hickox, Rohland A. Isker, John Knowles, Henry R. Kraybill, Paul D. V. Manning, F. N. Peters, H. N. Riley, Fred P. Siebel, E. S. Stateler, and Robert I. Tenney.

Lee Hickox, Vice-President of the Container Laboratories, Chicago, is directing a graduate course in Food Packaging Materials and Methods at the Illinois Institute of Technology. The course will comprise sixteen 2-hour lectures, to be given in the period between February 16 and June 8.

Representatives from the Chicago Section who were present at the I. F. T. Council Meeting on January 16 were: B. S. Clark (Councilor-at-large), C. L. Smith, A. E. Stevenson, B. M. Shinn, and (as Alternates), W. E. Pearce and J. M. Jackson.

Clarence K. Wiesman, of Armour & Co., spoke on "Storage of Meats" at the Southeastern Conference of the Refrigeration Research Foundation, in Birmingham, Alabama.

Mr. and Mrs. D. L. Drummer announce the birth of a son, Dalibor, Jr., December 16.

Dr. Victor Conquest was a speaker at the Chicago Area Career Council for high school students in December, 1948 and also served as one of the counselors.

NORTHERN CALIFORNIA SECTION

At the December 29 meeting of the Northern California Section, the following individuals were elected members:

E. N. Develter (Kadota Fig Assoc.); J. A. Dreyer (Benner-Nawman, Inc.); R. A. Whitmore (Food Machinery & Chemical Corp.); C. P. Collier (Food Machinery & Chemical Corp.); W. C. Dietrich (Western Regional Research Laboratory); R. P. Smith (Golden State Co., Ltd.); and M. J. Simone (Western Regional Research Laboratory).

At this same meeting, it was decided to establish a temporary status for student members, to provide inclusion on *The Hornblower* mailing list and assessment of $1.00 for dues. This status will be subject to change when the By-Laws of the Section are revised and when the National Council takes action on the subject.

The present membership of the Section is 389. Of these, 125 were enrolled in 1948.

The Hornblower will be published monthly in 1949 instead of bi-monthly as in the past.

Members of the Program Committee of the Northern California Section are Sharp, Stumbo, Marsh, Owens, Lang, and Russ Perry.

Friends of Professor W. V. Cruess will be sorry to learn that he is temporarily incapacitated. While he was repairing, at his ranch, a pipe that had burst as a result of the cold spell in January, a wrench slipped and he fell from a water tower. Two vertebrae were broken, and he will be out of circulation for some time. He will certainly appreciate receiving notes from his friends while he is at home.

Dr. Paul F. Sharp, Director of Research for Golden State Co., Ltd., was appointed Director of the Experi-

mental Station, Department of Agriculture, University of California, Berkeley. This appointment became effective on January 1st.

M. L. Crouthamel, West Coast Quality Control Representative for H. J. Heinz Co., has been promoted to the newly created position of manager of all factory quality control. He becomes the head of the research and quality control staff, with headquarters in Pittsburgh.

Miss Shirley I. Vollmer, formerly of the Hallmark Testing Service, Division of Safeway Stores, is now with the Department of Home Economics of General Mills, in Minneapolis.

NORTHEAST SECTION

The Boston Yacht Club was the meeting place for the Northeast Section on February 7. Here members enjoyed a real New England fish chowder and subsequently listened to papers on various phases of the fish industry, as follows:

"Technological Problems in the Fishery Industries," by Harold E. Crowther (Atlantic Coast Fisheries Co., Boston).

"Functions of an Industrial Fisheries Laboratory," by Charles E. Shackleford (The Great Atlantic & Pacific Tea Co., Boston).

"By-Products of the Fishing Industry," by Sidney L. Feener and Earl P. McFee (General Seafoods Corporation, Boston, and Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass.).

"Sanitation Problems of the Fishing Industry," by Stanley P. Hurley (Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass.).

"Some Objectives of Fishery Technology," by William F. Hampton (General Seafoods Corporation, Boston).

Dr. Joseph F. Puncochar, Director of the Boston Fishery Technology Laboratory, U. S. Fish and Wildlife Service, presided as chairman of the February 7 meeting.

Robert S. Scull, Vice-Chairman of the Northeast Section, joined the United States State Department the first of the year and has agreed to go overseas, in connection with the Marshall Plan effort. He will be in charge of food processing in Greece. Ernest C. Crocker has been appointed to fill his place as Vice-Chairman of the Section.

The new American Association of Candy Technologists has formed a section in this area. Charles Carilli of the Edgar P. Lewis Co. is Chairman and Donald Mitchell of the Walter Baker Co. is Secretary-Treasurer.

A. M. Kaplan has left the Department of Food Technology at the University of Massachusetts and has taken a position with the Division of Microbiology, Bureau of Agricultural and Industrial Chemistry, U. S. D. A., Beltsville, Md.

SOUTHERN CALIFORNIA SECTION

The fifty-sixth meeting of the Southern California Section was held on January 19 at the California Consumers Corporation of Pasadena. An appetizing meal utilizing some of the foods processed in the plant was served to 91 members and their guests. Following dinner, the President of the Corporation, Roy M. Hagen, gave a short talk on "Frozen Foods." Introductions were made of the men most closely concerned in the organization of the plant, namely, Douglas Jardin (plant engineer), Fred Burden (plant superintendent), Bill Ost (superintendent of transportation, warehouse and shipping), and George Martin (quality control). Interesting information concerning the food processed and the equipment used in the plant was given. A tour of the plant was also a feature of the meeting.

ST. LOUIS SECTION

On January 27, the St. Louis Section met at the Falstaff Brewing Corporation, where they heard a talk on "Organoleptic Evaluation of Edible Oils" by Dr. J. C. Cowan, head of the Oil and Protein Division, Northern Regional Research Laboratory, Peoria, Illinois.

NEW YORK SECTION

Dr. R. C. Sherwood has become Technical Director of the combined Vanillin Division of General Drug, Inc. During the war he was with the Civilian Requirements Branch of the War Food Administration.

E. D. Robbins, formerly of the Chef Boy-Ar-Dee Quality Foods, Inc., Milton, Pa., is now chemist for Limpert Bros., Inc., New York.

Dr. Orville E. May, of Atlanta, Georgia, has been elected Vice-President in charge of quality control of the Coca-Cola Co., New York City. He will direct all the scientific activities of the Coca-Cola Co. and will be in charge of all branch laboratories.

WESTERN NEW YORK SECTION

At an Executive Committee meeting on December 20, 1948, Willard Hahn of the Beech-Nut Packing Co. was elected a national councilor, bringing the number of councilors for the Western New York Section to two.

PHILADELPHIA

On January 13, members of the Philadelphia Section met at the Campbell Soup Co. in Camden, N. J., when they heard an address on "The President Speaks" by the national I. F. T. president, Dr. H. C. Diehl, and had an opportunity to meet with him informally.

MARYLAND

On January 14, the Maryland Section met for its regular session at the Hotel Stafford in Baltimore. Following the dinner, Lt. Col. Edward S. Hopkins of the Baltimore Bureau of Water Supply spoke on "Water Purification and Its Relation to the Food Industry."

MILK AND FOOD SANITARIANS

The 36th Annual Convention of the International Association of Milk and Food Sanitarians, Inc., will be held in Columbus, Ohio, on October 20th, 21st and 22nd, 1949, with official headquarters at the Deschler-Wallick Hotel.

The new roster of officers of the Association for 1949 is as follows: President, A. W. Fuchs, U. S. Public Health Service, Washington, D. C.; First Vice-President, M. R. Fisher, D. V. M., Department of Public Welfare, St. Louis, Mo.; Second Vice-President, K. G. Weckel, Ph.D., University of Wisconsin, Madison, Wis.; Third Vice-President, C. Sidney Leete, State Department of Health, Albany, N. Y.; Secretary-Treasurer, George A. West, Rochester Health Bureau, 44 Marshall Street, Rochester 2, N. Y.

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Selected Abstracts

ANALYTICAL METHODS

113I. A study of conditions for Kjeldahl determination of nitrogen in proteins. Description of methods with mercury as catalyst, and titrimetric and gasometric measurements of the ammonia formed.

HILLER, A., PLAZIN, J., AND VAN SLYKE, D. D. *J. Biol. Chem., 176,* 1401-20 (1948).

Methods are described in which digestion mixtures yield nitrogen values equal to those of the Dumas combustion method. The ammonia formed is determined by macro or micro titration, or by micro gasometric measurement. Only digestion mixtures containing mercury as catalyst are recommended for proteins.

114I. The calculation of hide substance from nitrogen determinations.

BOWES, J. H., KENTEN, R. H. *J. Soc. Leather Trades' Chemists, 32,* 308-10 (1948); *Chem. Abst., 42,* 9214[1] (1948).

In hide powder, untreated ox corium, ox hide variously limed, and calf skin variously limed, the percentage of N_2 was found to be between 18 and 18.6. Sheep skin, limed and pickled had about 17.2%. The results are on water-free and ash-free basis. Method of Chibnall, Reese, and Williams (Chem. Abst. 38: 128[1]) was used.

115I. Determination of starch in plant tissues.

PUCHER, G. W., LEAVENWORTH, C. S., AND VICKERY, H. B. *Anal. Chem., 20,* 850-3 (1948).

Starch is extracted from a 50- to 250 mg. sample of dried plant tissue with perchloric acid as recommended by Nielsen, precipitated with iodine, and recovered as starch which is hydrolyzed and determined as glucose. The results are independent of the composition of the starch of different species with respect to amylose and amylopectin. Theoretical recoveries of glucose from pure potato starch are obtained; the experimentally determined factor is 0.90 with an uncertainty of ± 1.2%. The precision of the method as applied to a variety of plant tissues is approximately 2%.

116I. Use of lyophilization in determination of moisture content of dehydrated vegetables.

MAKOWER, B., AND NIELSEN, E. *Anal. Chem., 20,* 856-8 (1948).

A new reference method for the determination of moisture content of dehydrated vegetables involves addition of a large amount of water to a weighed sample of vegetable; freezing and drying in the frozen state (lyophilization); and completion of the drying in a vacuum oven or vacuum desiccator in the presence of an efficient water adsorbent. The last step can be completed in a relatively short time at, or slightly above, room temperature, because of a marked increase in drying rate brought about by lyophilization. Data presented for white and sweet potatoes, beets, and carrots show that the lyophilized materials can be dried unambiguously to constant weight, and that the loss in weight may be taken as a measure of the moisture content. As the final dry weight is virtually independent, within wide limits, of the temperature of drying, the new method obviates the necessity of careful control of drying temperature.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

117I. Crystalline α-amylase from barley malt.

SCHWIMMER, S., AND BALLS, A. K. *J. Biol. Chem., 176,* 465-6, Oct., 1948.

The crystals were obtained from commercial malt extract by a process utilizing the high stability of the crude enzyme toward heat and its highly selective adsorption on raw starch from 40% alcohol in which it is soluble. Twice crystallized material contained 13.4% N and the α-amylolytic activity per unit of N was 67 times that of the original extract. The enzyme is unstable in absence of Ca.

118I. Anaerobic formation of fumaric acid by the mold Rhizopus nigricans.

FOSTER, J. W., AND DAVIS, J. B. *J. Bact., 56,* 329-38 (1948).

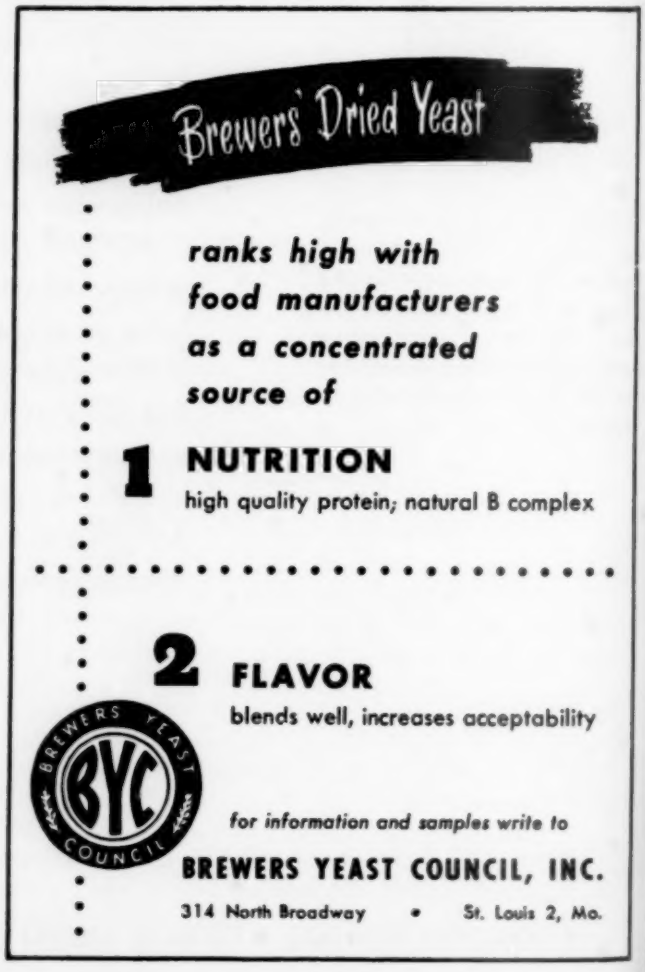
A strain of *Rhizopus nigricans* forms fumaric acid anaerobically from glucose in yields of about 20% of the carbohydrate consumed. The other products formed are ethyl alcohol, lactic acid, and CO_2.

119I. Nucleonic sterilization without heat.

Ind. Bull., No. 248, Nov., 1948.

Investigations carried out at the M. I. T. Laboratories of Food Technology on the use of cathode rays and x-rays in heatless sterilization of food products are described. Cathode rays at high voltage kill all tyes of bacteria in less than ten seconds when sufficient current is used. A machine to be built next year at M. I. T. will be powerful enough to penetrate small cans and sterilize the food within the sealed container. Because much greater power is required to inactivate enzymes by the cathode ray method, it is suggested that a simple heat treatment together with cathode or x-rays may be a workable sterilization combination. Treatment by cathode rays and x-rays has been found to cause butter and olive oil to become rancid more quickly, and causes partial destruction of vitamin C in orange juice. Flour weevil are destroyed so quickly by the method that larger machines can handle the flow of a full sized mill. The method is said to be the most rapid known for sterilizing milk, but flavor problems result.

(Turn to page 4)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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 2)

NUTRITION

120I. The relative biological values of the proteins in cereal grains.

SURE, B., AND HOUSE, F. *J. Nutr., 36,* 595-600 (1948).

The biological values of milled and whole cereal grains, fed at a 5% protein level, were determined by the Mitchell nitrogen balance method. The protein utilization for the milled grains was as follows: rice, 75.1; wheat, 60.0; rye, 63.1; corn, 32.0. The findings for the whole cereals were: rice, 80.0; wheat, 76.1; rye, 73.2; corn, 78.8; and rolled oats (oatmeal), 75.6.

121I. Amino acid content of chicken.

MILLARES, R., AND FELLERS, C. R. *J. Am. Diet. Assoc., 24,* 1057-61, Dec., 1948.

An investigation was undertaken to determine the proportions of the indispensable amino acids in the protein of chicken meat, and to compare chicken meat with other common sources of food protein. Analyses by microbiologic methods indicated that chicken meat is equivalent to beef, pork, lamb, and veal meats on the basis of content of amino acids.

122I. Thiamine and riboflavin retention in beef tongue.

NOBLE, I., GORDON, J., AND CATTERSON, L. *J. Am. Diet. Assoc., 24,* 1068-9, Dec., 1948.

The thiamine and riboflavin contents of beef tongue have been determined by flourometric methods on three lots after simmering until tender (an average of 3 hr.) in sufficient water to cover, and on two other lots both before and after similar cooking. They ranged around 0.10 and 0.30 mg. per 100 gm. moist raw meat and around 0.04 and 0.35 mg. per 100 gm. moist cooked meat, respectively. The amount of thiamine retained in the tongue after cooking was about one-third of the quantity originally present in the raw sample. Another third was found in the cooking liquid. The amount of riboflavin retained in the cooked tongue was around nine-tenths of that present in the raw sample. The quantity dissolved in the cooking liquid was large also, so that the total riboflavin in the cooked meat and cooking water was greater than the amount found in the original raw sample.

123I. The vitamin B complex.

ELVEHJEM, C. A. *J. Am. Med., Assoc., 138,* 960-73 (1948).

A complete history and review, with an extensive bibliography.

124I. New vitamin discovered.

SCHNEIDER, H. A. *Sci. N. L., 54,* 323, Nov. 20, 1948.

A new vitamin which increases the natural resistance of the mouse to Salmonellosis, or mouse typhoid, has been found in cereals, grasses, wheat germ, and alfalfa. The vitamin was found to affect disease resistance in mice of mixed heredity, but not in inbred strains. The vitamin has not yet been isolated and identified chemically.

125I. Liver damage and growth in the rabbit.

THACKER, E. J., AND ELLIS, G. H. *J. Nutr., 36,* 579-91 (1948).

A diet of whole milk powder fortified with manganese, copper, iron and iodine is inadequate for the rabbit, growth is subnormal and the livers are damaged. Large amounts (50%) dehydrated alfalfa meal are needed to prevent liver damage, while only 1% is needed to stimulate growth. Roughage or known vitamins will not alleviate the condition. On purified diets rabbits evidently also need "animal-protein factor."

126I. Adding special sugar helps body utilize fats.

RICHTER, C. P. *Sci. N. L., 54,* 294, Nov. 6, 1948.

Rats made far better use of the fat in their diets when small amounts of galactose were present. Studies were made by the "single food choice" technique, and the length of time the rats survived was taken as a measure of the nourishing value of the foodstuff. Adding galactose to an oleomargarine diet more than doubled the survival time of the animals. Five percent or less of the total calories came from the galactose. Preliminary experiments with corn oil have yielded essentially the same results.

127I. Effect of feeding moderate levels of commercially agenized flour to dogs.

NEWELL, G. et al. *Proc. Soc. Expt. Biol. and Med., 69,* 1-2, Oct., 1948.

Dogs fed commercially treated flour (1.5 g. NCl_3/cwt.) did not develop running fits or electroencephalographic abnormalities after 12-14 months use.

128I. Effect of electronic cooking on nutritive value of foods.

THOMAS, M. H. et al. *J. Am. Diet. Assoc., 25,* 39-45, Jan., 1949.

The cooking time and amount of water used were the determining factors in retention of nutrients in vegetables. In the three cooking methods tested, the amount of water used had the greatest influence on the retention of water-soluble nutrients, the pressure cooking technique resulting in superior retention as compared to the boiling water and electronic range techniques. Thiamine retention was higher in meat patties cooked by high frequency energy than in patties cooked by grilling. Niacin and riboflavin were equally stable in both methods of cooking. Beef roasts showed slightly better retention of thiamine, riboflavin, and niacin when prepared in the oven than in the electronic range.

PHYSIOLOGY

129I. Carbon tetrachloride poisoning.

ABBOTT, G. A., AND MILLER, M. J. *Public Health Rep., 63,* 1619-24, Dec. 10, 1948.

The present allowed standard maximum is 100 parts of carbon tetrachloride per million of inspired air. Toxic reactions to carbon tetrachloride may result from a single brief exposure to a high concentration of the vapor, from prolonged or repeated exposure to a moderately high concentration or from regular daily exposure to lower concentrations; also from repeated contact with the skin or from ingestion. Obese persons, alcoholics, or undernourished individuals are likely to be especially susceptible to carbon tetrachloride injury, as are those with diabetes, liver or kidney disease, jaundice, pulmonary or heart disease, or peptic ulcers. Most of the poisoning cases could have been avoided by the proper ventilation.

FOOD PRODUCTS

COFFEE AND COCOA PRODUCTS

130I. Electronics—a new method for coffee roasting control.

SLATER, L. E. *Spice Mill, 71,* 14-15, Dec., 1948.

An electronic type of potentiometer radio-amplifies the electric signal generated by a thermocouple and provides a continuous, positive temperature measurement. The instrument can be used to provide an exact indication of when to terminate a roast from actual bean temperature.

131I. Cacao center at Turrialba.

BOWMAN, G. F. *Foreign Agric., 12,* 264-7, Dec., 1948.

The Inter-American Cacao Center is a part of the Inter-American Institute of Agricultural Sciences at Turrialba, Costa Rica. The center is organized to coordinate research work on cacao from all the interested countries of Latin America and to train students from these countries and from the other members of the Pan American Union in the basic principles of cacao cultivation. Phytophthora palmivora (pod rot of cacao) and its control is being studied.

FISH AND SEAFOOD

132I. Some data on pH and freshness of shucked Eastern oysters.

POTTINGER, S. R. *Comm. Fisheries Rev. 10,* 1-3, Sept., 1948.

With only two exceptions, the commercially shucked oysters had an initial pH of 6.2 or above. All of the samples that were shucked and blown in the laboratory had an initial pH above 6.2. Some variation in pH was found in both groups. During

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Abstracts

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storage, the pH decreased gradually as the oysters became less fresh. For purposes of setting some arbitrary standard of comparison, the oysters were considered to be on the verge of inedibility when a distinct "off odor," no longer associated with that of "fresh" oysters, was noticeable. The bulk of the samples remained in good condition for ten days to two weeks before the off odor became apparent. The pH values of all of the oysters at the time the off odor was first noticed varied between 5.96 and 5.65. The data indicate, however, the pH values are a useful index in following changes in the degree of freshness of shucked Eastern oysters and should have some value in indicating quality when used in conjunction with other tests.

FROZEN FOOD

133I. Effect of storage temperature on frozen foods.

WOODROFF, J. G., AND SHELOR, E. *Refrig. Eng., 56,* 514-17, Dec., 1948.

There was a continual loss of natural appearance, color, aroma, and flavor when asparagus, snap beans, corn, strawberries, blackberries, raspberries, and peaches were held in freezing storage for one year or more. All of these except snap beans lost up to 50% of firmness and increased in leakage. When other conditions were constant, the rate at which these changes took place was directly related to the temperature of storage. Those products stored at —15° F. or lower were scored higher at each examination than those stored at higher or at fluctuating temperatures. These results extending over four years with temperatures ranging from —20 to 10° F. seem to show that 0° F. is adequate for most frozen foods for the period generally practiced. However, for some commodities or for periods of a year or more, —10 or —15° F. is preferable. Temperatures above 0° F. were not found satisfactory for any of the products studied.

134I. Frozen egg quality depends on clean eggs, clean equipment, and quick cooling.

WINTER, A. R., AND WRINKLE, C. *U. S. Egg Poultry Mag., 55,* 7-9, Jan., 1949.

Clean eggs with sound shells and good interior quality are essential to the production of liquid egg products with a low bacterial content. Pasteurization of liquid whole egg or yolk at 140-142° F. for two minutes, or of egg white at 134-135° F. for the same length of time, will kill more than 99% of the bacteria present in the product. Liquid egg should be placed in the freezer (—10° F., or below) as soon after preparation as possible because bacteria immediately may begin to multiply rapidly, especially if the egg is held above 60° F. Breaking plant equipment should be cleaned at least four times a day. All dead-end passages, exposed gaskets, and other sources of bacterial contamination should be eliminated in order to prevent bacterial multiplication and high count products.

135I. Precooking pork for freezing storage.

WATTS, B. M., PENG, D. H., AND KLINE, E. A. *J. Home Ec., 40,* 579-81, Dec., 1948.

Pork roasts precooked before freezing rated lower in palatability but higher in thiamine retention than paired cuts from the same animal cooked after freezing storage. Rancidity was not an important factor in palatability changes. Thiamine values for the raw meat and palatability scores for the cooked meat varied from animal to animal, even though all hogs were on the same rations. Aluminum foil was superior to waxed paper for wrapping. Chops to be precooked could be cooked, frozen, and thawed in the wrapper; thus bacterial contamination after cooking would be prevented.

136I. Concentrated and then quick frozen orange juice retains its vitamin C.

ROY, W. F., AND RUSSELL, H. E. *Food Ind., 20,* 1764-5 (1948).

Control laboratory data suggest that the nutritional value of orange juice reconstituted from the frozen concentrated juice is higher than that of the fresh juice. Reason for the higher

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News of the Institute

PRESIDENTIAL CITATION

Dr. Ellery Hale Harvey has received that most distinguished decoration for civilian service, "The President's Certificate of Appreciation for outstanding contributions to the Office of Scientific Research and Development during World War II." This certificate was presented to him at ceremonies held in New York on December 10, 1948.

The Institute of Food Technologists takes just pride in this well-merited recognition received by Dr. Harvey, because his professional activities have been so long and so intimately associated with the affairs of the Institute. He is a charter member and a Past President of I. F. T. He was the founder of the Chicago Section and subsequently was instrumental in organizing the St. Louis Section of I. F. T. He organized the first annual conference of the national society in 1940 and, later, the annual conference in 1943. He likewise created the Nicholas Appert Medal Award which, since its inception, has proved to be the high point of each annual conference.

The heartiest congratulations of the Institute of Food Technologists are extended to Dr. Harvey on this Presidential Recognition of his contributions to the nation in its time of need.

TOWARD LARGER MEMBERSHIP

A Food Technology Group has been formed in Georgia for the South Atlantic area and, as of February 1st, had already held three meetings. The officers elected are:

Chairman: Dr. Roy E. Morse, Food Technology Department, University of Georgia, Athens.

Vice-Chairman: Dr. J. G. Woodroof, Georgia Experiment Station, Experiment.

Secretary-Treasurer: Dr. T. W. Kethley, Engineering Experiment Station, Atlanta, Georgia.

The membership numbered 35 at the beginning of February. The central meeting place is in Atlanta, Georgia, but members come not only from Georgia but also from parts of South Carolina, Alabama, and Tennessee that are within reasonable driving distances from Atlanta. At the suggestion of one of the members, it is proposed to call this group the "Dixie Section," and the probabilities are that when the membership increases, steps will be taken to make this a Regional Section of I. F. T.

The Ohio Valley Association of Food Technologists met in Columbus on February 5, with an attendance of 102. The group will have another meeting on May 21, at the Brown Hotel in Louisville. It is hoped that the group will qualify as a regional section of I. F. T.

A communication received from Colonel Charles S. Lawrence, President of the Quartermaster Board at Camp Lee, Virginia, indicates that interest in the formation of a Regional I. F. T. Section in that vicinity is growing. On February 18, at Richmond, Virginia, a meeting of food technologists was held at which 35 were present, including members and non-members of I. F. T. At the conclusion of a talk on "The Objectives

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News of the Institute

(Continued from page 6, preceding Editorial)

of the I. F. T." by Stephen L. Galvin, Secretary of the New York Regional Section, it was decided to form a Food Technology Discussion Group. A committee was appointed to handle arrangements for future meetings, which will be held in various cities of the Virginia-North Carolina area. This committee is composed of:

Mr. Horace L. Smith, Jr. (Chairman), 301 Loch Lane, Richmond 21, Va.
Dr. Lyle L. Davis, Virginia Agricultural Experiment Station, Blacksburg, Va.
Mr. J. M. Fultz, Research Laboratories, Reynolds Metals, 10th and Byrd Sts., Richmond, Va.
Dr. Ivan D. Jones, Department of Horticulture, North Carolina State College, Raleigh, N. C.
Mr. W. A. Rooker, 112 E. Piccadilly, Winchester, Va.

It is hoped that by next autumn the group will have a sufficient number of I. F. T. members to form a Regional Section.

OUTSIDE PROFESSIONAL ACTIVITIES OF I. F. T. MEMBERS

At a meeting of the American Society of Refrigerating Engineers held in Washington, D. C., December 6-8, 1948, I. F. T. members gave papers as follows:

J. G. Woodroof, Georgia Agricultural Experiment Station: "Effects of Storage Temperature and Time upon Certain Fruits and Vegetables."
Gladys Vail, Kansas Agricultural Experiment Station: "Relationship of Storage Temperature to Characteristics of Frozen Pork."
Andrew Hustrulid *et al.*, University of Minnesota: "Effects of a Fluctuating Storage Temperature in Frozen Foods."
F. A. Lee, New York State Agricultural Experiment Station: "The Effect of Freezing Rate on Vegetables."

At a meeting held for discussion of "Merchandising through Research" at the annual convention of the National Association of Refrigerated Warehouses at San Francisco, February 7-10, the speakers included the following I. F. T. members:

Paul B. Christenson, Merchants Refrigerating Co., New York, N. Y.
Paul P. Logan, National Restaurant Association, Chicago, Ill.
Thomas W. Rector, General Foods Corp., New York, N. Y.

At the January 17 meeting of the Chicago Dairy Technology Society, Mr. Albert I. Kegan, a Chicago patent lawyer, was the principal speaker. His topic was "Trends in Government Regulation of the Food Industry."

At the Annual Meeting of the Southeastern Poultry and Egg Association, held in Atlanta, Georgia, Henry J. Reynolds of Armour & Co., Chicago, Ill., presented a paper on "Processing Improvements and Changes in Poultry."

At the Annual Convention of the National Canners Association in Atlantic City, January 14-20, Gordon T. Peterson of the Continental Can Co., Chicago, Ill., gave a paper on "Comparative Merits of Existing Methods of Producing Vacuum in Cans," and Robert W. Pilcher (American Can Co., Chicago, Ill.) and L. E. Clifcorn (Continental Can Co., Chicago, Ill.) gave a paper on "Nutrient Retention in Canning — A Summary of N. C. A.—C. M. I. Research Results."

At a meeting of the Association of Vitamin Chemists held in Chicago on February 10, Dr. James F. Feaster of the American Can Company, Maywood, Ill., led a discussion on methods of determining ascorbic acid. At this same meeting, Mrs. Mardell Tompkins, also of the American Can Co., delivered a paper entitled "Roe Method of Determining Vitamin C in Food Materials."

Regional Section News

CHICAGO SECTION

On February 21, the Chicago Section heard a talk given by Mr. E. C. Crocker of the Northeast Section on the subject of "Taste Evaluation of Foods." There was an attendance of 188 members for dinner and of approximately 200 members for the meeting, an attendance among the highest in the Section's history.

The following list of appointments to committee chairmanships for 1949 was announced at the meeting on January 24:

Auditing: Elmer F. Glabe, Food Technology, Inc., 5903 N. Northwest Highway, Chicago.
By-Laws: Gordon E. Carlson, College Inn Food Products Co., 4301 S. Ashland Ave., Chicago.
Finance: Robert M. Schaffner, Libby, McNeill & Libby, Union Stock Yards, Chicago.
Hospitality: Dorothy Ann Huber, QM Food and Container Institute, 1849 W. Pershing Road, Chicago.
House: Otto G. Braun, Research Division, American Can Co., Chicago.
Membership: William J. Shannon, Oscar Mayer & Co., Madison 1, Wisconsin.
Program: Rohland A. Isker, Pilgrim Advertising, Inc., 222 West Adams St., Chicago.
Publications: Milton E. Parker, Illinois Institute of Technology, 3300 S. Federal St., Chicago.
Speakers Bureau: Leslie R. Hedrick, Illinois Institute of Technology, 3300 S. Federal St., Chicago.
Student: Virgil O. Wodicka, Libby, McNeill & Libby, 13636 S. Western Ave., Blue Island.
Historian: E. S. Stateler, Food Industries, 520 N. Michigan Ave., Chicago.
Parliamentarian: Milton L. Laing, Armour & Co., Union Stock Yards, Chicago.

Berton S. Clark has been appointed Chairman of the Packing, Packaging and Preservation Committee, National Research Council Advisory Board on Quartermaster Research and Development.

Milton E. Parker addressed the Women's Civic Club of Berwyn on January 18, on the subject of "Food Facts, Foibles, and Fancies."

Albert I. Kegan addressed a dinner meeting of the newly formed American Association of Candy Technologists, on February 3, on the topic "Trends in Government Regulation of the Candy Industry."

Gordon H. McDonell presented a technical paper on "The Canning of Beer" at the local meeting of the Master Brewers Association in Chicago on January 10.

Arthur E. Mudra was a speaker at the Indiana Corn Canners School at Purdue University on January 27.

L. E. Clifcorn has been appointed Chairman of the Exposition Trustees for the Sixth National Chemical Exposition, to be held in Chicago in 1950.

Charles L. Smith addressed two sections of the Campbell Soup Company Foremen's Club on January 4.

William J. Shannon, of Oscar Mayer & Co., Madison, Wisconsin, gave a talk to chemical engineers at

the University of Wisconsin on "Food Technology and the Chemical Engineer."

Members who have left the Chicago Section in recent months and gone elsewhere are listed below, together with their new addresses:

Name and old address
D. Q. Anderson, 474 Laurel St., Elgin, Ill.
New address: Florida.
Alvin J. Alton, Beatrice Creamery Co., Chicago, Ill.
New address: Taylor Freezer Co., Beloit. Wis.
Dr. John Van Dolah, Carnation Company, Milwaukee, Wis.
New address: Los Angeles, Calif.
A. E. Guest, 4106 Gilbert Ave., Western Springs, Ill.
E. A. Seipp, Golden State Sales Corp., Chicago, Ill.
New address: University Club, San Francisco, Calif.
Sue Cassell Stevens, Stevens Candy Kitchen, Chicago, Ill.
New address: 605 W. State St., Jacksonville, Ill.
Robert D. Walter, Corn Products Refining Co., Chicago, Ill.
New address: 3064 Kimball Rd., Memphis, Tenn.
Glenn H. Whetzell, Armour & Co., Chicago, Ill.
New address: Standard Oil Co.

NORTHERN CALIFORNIA SECTION

On February 17, the Northern California Section met in San Francisco and enjoyed an interesting double-feature program. The first feature was a motion picture entitled "The Salvage of the M. S. Diamond Knot," the story of the salvage operations on the cannery barge that sank in Alaskan waters last year. The speaker of the evening was John T. Walsh, in charge of quality development for the American Dried Milk Institute. His topic was "Packaging and Shipping of Hygroscopic Food Products," with special reference to dried milk.

A meeting has been planned for April 21, to be held in the East Bay. George Amerding (Majonnier Corp.) will describe the Majonnier "Lo-Temp" concentrator.

No section meetings will be held in July or August, because of the National Annual Meeting to be held July 11-14 in San Francisco. The joint meeting with the Southern California Section in October will also probably be cancelled this year, but a more definite announcement will be made later.

In accordance with the decision to establish a temporary status for students, the following were approved for student membership: Dale C. Miller, Tatsuo Sano, Gordon E. Miller, Chin-tzu Peng, Charles V. Lin Loy, and Robert L. Church.

National members transferring to the Northern California Section during the past few months include John H. Kilbuck and Albert J. Kraght of the University of California, and Calvin E. Bright of Frosted Foods, Sacramento.

Newly elected members include Edward M. Potter (Frostcraft), Robert L. Hughes (Pacific Grape Products), Richard E. Heyl (A. E. Staley), Rybern Gillespie, Preston Hunter and Georg Marinakis (all three of Kraft Foods), William H. Orth (Peerco Corp.), Vincent J. Lawson (Globe, Pillsbury Mills), and Herbert Lipke (California Packing Corp.).

George W. Burgess, of the Hawaiian Pineapple Company, and Carol C. Farley were married on November 15, 1948, at Laguna Beach, California.

Leo A. Berti, of the Coast Laboratories in Fresno, and Paula Margaret Gould were married on November 28, 1948, at Reno, Nevada.

Congratulations go to Dr. and Mrs. Emil M. Mrak (University of California) on the birth of a son, Robert Emil, on December 18, 1948.

F. K. Lawler, who is organizing the discussion group on "Advanced Food Plant Engineering" for the July Annual Meeting, was formerly Executive Editor of Food Industries and is now Editor in Chief.

Michael Arnaudo, chemist for California Packing Corporation, occupies his spare time as President of the Spastic Children Society and also serves as Vice-President and Program Chairman of the Washington School Dad's Club.

Paul Hunt, Advertising Manager of *The Hornblower* and associated with Owens-Illinois, has had a trip to the Hawaiian Islands.

Richard D. McKirahan, of the American Can Company, San Francisco, was called to Los Angeles to take over temporarily the vacancy caused by the death of Paul Alexander (see obituary in March issue of FOOD TECHNOLOGY).

Reese H. Vaughn, of the University of California, spoke at a Food Technology Conference at Corvallis, Oregon, on February 15 on the subject of plant sanitation. On February 17, he spoke at an olive conference in Corning. Last December he addressed a group of wine technologists in Lodi.

Maynard A. Joslyn, of the University of California, discussed the subject of "The Objective Evaluation of the Application of Various Sugars to Food Products" at the Dairy short course, Davis, in early February.

National President Dutch Diehl has been elected a Fellow in the American Public Health Association. On February 6-10 he held a joint Annual Meeting, at the Mark Hopkins Hotel, of The Refrigeration Research Foundation and the National Association of Refrigerated Warehouses.

NORTHEAST SECTION

A successful and well-attended meeting on "Fishery Technology" was held on February 7 at the Boston Yacht Club, right out on the ocean. The rooms of the club were virtually in a sail loft, over a wharf, and had all the marine atmosphere needed, with boat models on the wall and a ship's clock striking out the half hours. After a fish chowder dinner and entertainment by a barbershop quartet, five papers were read concerned with present operation and opportunities for improvement by the fishing industry. (See March issue of FOOD TECHNOLOGY for names of speakers and titles of papers.)

Approximately 150 members and guests attended this meeting, and the fishing industries in Boston and environs were well represented. A number of out-of-town guests were present, as follows:

Lamar Kishlar, Ralston Purina Co., St. Louis, Mo.
J. M. Lemon, U. S. Fish and Wildlife Service, Washington, D. C.
Arthur Monroe, Fishery Products Ltd., St. John's, Newfoundland.
B. F. Buchanan and S. E. Juratovic, International Mineral & Chemical Corp., Chicago, Ill.
John B. Glud and John R. Webster, U. S. Fish and Wildlife Service, Woods Hole, Mass.
Boris O. Knake, U. S. Fish and Wildlife Service.
M. G. O'Connor, Health Department, Springfield, Mass.

Robert L. Perry, Department of Sea and Shore Fisheries, Augusta, Maine.
Francis W. Sargent, Director of the Division of Marine Fisheries, Commonwealth of Massachusetts.
Howard S. Willard, Chief Coastal Warden, Commonwealth of Massachusetts.

Ernest C. Crocker, present Vice-Chairman of the Northeast Section, a charter member of I. F. T., and associated with Arthur D. Little, Inc., Cambridge, Mass., has given talks all over the Midwest this season on "The Chemistry of Flavor and Odor." These talks he has presented as a touring speaker for the American Chemical Society, of which he is chairman of the Northeastern Section this year. One of his talks, at Chicago, was under I. F. T. sponsorship, and two others were under the joint sponsorship of the American Chemical Society and I. F. T. On February 23 he gave this talk at a joint meeting of the Iowa Section of I. F. T., the Ames Section of the American Chemical Society, and the Iowa State College Research Council. Recently Mr. Crocker has been engaged in problems involving the application of the senses of smell and taste to industrial products. His numerous papers and his book on "Flavor" have attracted wide attention.

The many friends of Mason T. Rogers will be pleased to learn that he is making steady progress since his recent illness and is up, if not yet about freely. He will be happy to receive letters, addressed to his home at 48 Cedar Road, Belmont, Mass., and may now have short visits from his local friends.

I. F. T. members will be sorry to learn that Michel P. Vucassovich, of the Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass., had the misfortune to break his ankle while on a trip to Nova Scotia. He is recuperating satisfactorily and will soon be about again.

Several members of the Northeast Section are planning to attend the annual I. F. T. meeting in San Francisco in July. At this time the following can be named: L. B. Sjöström of Arthur D. Little, Inc.; B. E. Proctor of the Department of Food Technology, Massachusetts Institute of Technology; Michel Vucassovich of Gloucester; Carl R. Fellers of the University of Massachusetts. Efforts will be made to have a special car, if enough persons are interested.

SOUTHERN CALIFORNIA SECTION

At the February 16 meeting of the Southern California Section, Dr. Franz Goetzl, Director of the Permanente Foundation for Research in Oakland, California, spoke on "Studies on Human Appetite." He described an instrument used in the Institute by means of which the threshold for the perception of a standard smell can be measured quantitatively. Following his talk, Dr. A. J. Haagensmit, of the California Institute of Technology, led a lively discussion.

Two guests of note present at the dinner were Dr. B. Bloemers of the University of Utrecht, Holland, and Dr. S. C. Prescott, Dean Emeritus of the Massachusetts Institute of Technology, active in the origination of the National Institute of Food Technologists.

Dr. P. K. Bates, Section Councilor, reported to the group on the business conducted by the Council Meeting in Atlantic City on January 16.

The forty odd radio broadcasts of the Southern California Section of the American Chemical Society have featured interviews with "Chemists in Action," among whom were individuals who are also members of I. F. T. These particular individuals and the subjects of their interviews are as follows:

Dr. Philip K. Bates: Hay Fever.
Dr. Arthur N. Prater: Food Flavorings.
Mr. Leslie Hart: Chemists in Agriculture.
Dr. Willard E. Baier: Citrus Fruit Products.
Mr. Abe Seldner: Chemistry and Pleasant Smells.
Mr. Arthur Cherkin: Eating through a Needle.
Mr. Franklin H. Hunsicker: Making Appertizing Appetizing.
Dr. Harry J. Deuel: Progress in the Chemistry of Nutrition.
Dr. Margaret G. Morehouse: Fat Soluble Vitamins.

ST. LOUIS SECTION

On February 17, the St. Louis Section met at the Monsanto Chemical Company. The speaker of the evening was Dr. B. F. Buchanan, Technical Service Director, Amino Products Division, International Mineral and Chemical Corporation, Chicago, Ill. He spoke on the subject of "Monosodium Glutamate and Its Use in Food Manufacture."

GREAT LAKES SECTION

On January 28, the Great Lakes Section met in the Engineering Society Building at Detroit, Michigan. During the afternoon session the following papers were presented:

Mr. William J. Scarlett, Wallace & Tiernan Co., Newark, N. J. Subject: "Chlorination Applied to the Food Industry."
Mr. C. D. Pratt, Atlas Powder Co., Wilmington, Delaware. Subject: "Food Emulsifiers from the Hexitols."
Mr. Sereck H. Fox, Technical Director of Gelatine Products, Division of R. P. Scherer Corp., Detroit, Michigan. Subject: "Four Billion Capsules Annually." His talk was accompanied by a short motion picture on the problems associated with capsule production.

Following the dinner, at which 35 members were present despite hazardous driving conditions, Mr. R. C. Pollock, General Manager of the National Live Stock Board, Chicago, Ill., gave a talk on "Animal Agriculture and the Nation's Economy."

To aid in getting news of interest to the office of the national I. F. T., President Ray Wakefield appointed members of the Great Lakes Section to send news to the local secretary, who in turn will edit and forward the news to the appropriate Associate Editor of FOOD TECHNOLOGY. These members are:

Mr. Paul A. Wolf, Dow Chemical Co., Midland, Mich.
Miss Edna Mae McIntosh, Gerber Products Co., Fremont, Mich.
Mr. T. B. Calder, W. Clark Ltd., Montreal, Canada.
Miss Pauline Paul, Michigan State College, E. Lansing, Mich.
Miss Camille Beauchamp, Westinghouse, Mansfield, Ohio.

PHILADELPHIA

On February 11, the Philadelphia Section held a dinner meeting, at which the speaker was Mr. Martin Eisenstaedt, Director of Bakeries, American Stores Company. The subject of Mr. Eisenstaedt's talk was "Controlling Processes in Bakery Management."

MARYLAND SECTION

On February 11, the Maryland Section met for its regular session at the Hotel Stafford in Baltimore. Following the dinner, Mr. C. D. Pratt of the Atlas

Powder Company of Wilmington, Delaware, spoke on "Food Emulsifiers from the Hexitols."

Dr. Ira A. Gould, formerly Professor of Dairy Manufacturing at the University of Maryland, has become Chairman of the Department of Dairy Technology at Ohio State University.

PUGET SOUND SECTION

Members of the Puget Sound Section met at the food products plant of the Crescent Manufacturing Company, Seattle, Washington, on the evening of February 15. A comprehensive tour of the plant was made, and members were afforded an opportunity to see methods used in manufacturing and procedures used in controlling the grades of the many quality products put up by the Company. The tour was followed by refreshments and a business meeting.

New Executive Committee members were elected as follows:

James C. Palmer, U. S. Food and Drug Administration, Seattle, Wash.
Robert L. McDonald, Deming & Gould Co., Seattle, Wash.
Clarence W. Hurlbut, Blue Banner Foods, Kent, Wash.

An invitation was extended to the British Columbia Food Technologists' Association to hold a joint meeting, on March 17, with the Puget Sound Section at the Montlake Laboratory of the United States Fish and Wildlife Service, on the campus of the University of Washington.

MOHAWK VALLEY SECTION

On January 25, the Mohawk Valley Section heard a talk by Dr. Robert C. Hockett, Scientific Director of the Sugar Research Foundation, who spoke informally on problems being studied by the Foundation that are of interest to members of the food industry. Following a discussion period, two motion pictures were shown, one depicting the growth and processing of cane and beet sugars, the other the idea of photosynthesis.

On February 24, the group was addressed by Mr. Thomas J. Page, Agricultural Advisor for the National Broadcasting Company, who spoke on "Certain Peacetime Applications of Atomic Energy and its By-Products, with Special Reference to Food Production and Processing."

OHIO VALLEY ASSOCIATION OF FOOD TECHNOLOGISTS PLANS TO AFFILIATE

Winter Meeting, February 5, 1949

A splendid attendance of 102 food technologists and guests was just one of the high lights of the February 5, 1949 meeting of the Ohio Valley Association of Food Technologists.

The Ohio State University and Battelle Memorial Institute served as hosts, presenting a program of interest to all.

Preceding the meeting an informal luncheon was held at the University Faculty Club, followed by registration at Battelle Memorial Institute. Members and guests were divided into small groups and conducted on tours through the Nation's leading scientific industrial institute. Those not familiar with Battelle were amazed at the facilities available and the scope of their endeavors.

Three excellent papers constituted the technical program held during the afternoon. Dr. P. O. Powers, of Battelle Memorial Institute, presented "Plastic Materials for Food Containers," a lecture that described the various plastic materials available, the physical and chemical character of each, their suitability for making films, foils, castings, latices, and calendered or extruded sheets.

Dr. O. F. Garrett, Director of Research for M & R Dietetic Laboratories, presented a fine paper entitled "Protein Modifications as Applied to the Food Industry." Dr. Garrett described numerous methods of modifying proteins, and gave several examples, stressing the use of the ion exchanges in the dairy industry.

Dr. M. L. Wolfrom, Professor of Organic Chemistry, Ohio State University, and renowned authority on sugars, lectured on "Some Aspects of Sugar Chemistry in Relation to Food Processing," elaborating upon the chemistry of the Maillard reaction in acid and alkaline media.

Professor T. S. Sutton, of Ohio State University, presided over the Round Table discussion which considered "What Industry Looks for in a Food Technologist" and, too, "What the University is Teaching its Food Technology Students." D. C. McCoy, Frigidaire, Dayton, Ohio, and R. L. Titus, Nestles Corporation, Marysville, Ohio, spoke for the food industries, and M. Paul Hudson, Dean of the Ohio State University Graduate School, spoke for the universities, describing the curriculum of a present day food technology student. This discussion brought considerable comment from the floor.

At the business session, the secretary read minutes of the November meeting, which were approved as read, and reported a treasury balance of $17.43. M. A. Youtz, of Battelle, Chairman of the nominating committee, presented the following slate of officers:

Chairman: M. H. Volle.
Vice-Chairman: H. D. Brown.
Secretary-Treasurer: D. J. Ridenour.

A motion was passed requesting the secretary to cast a ballot for the nominated officers who are to serve for one year.

Mr. R. B. McKinnis, program chairman for the Spring meeting to be held in Louisville, Kentucky, on May 21, 1949, elaborated upon plans for that meeting.

Chairman Volle appointed a committee which is to ascertain the requirements of I. F. T. for our affiliation, and to present plans for such action at the Spring meeting. Those appointed to this committee were: Dellwo—Chairman, Ridenour, Alteman, Chester, and McCoy.

In the evening there was a fine illustrated lecture by E. S. Thomas, Curator of Natural History, The Ohio State Museum. With colored slides, Dr. Thomas showed what Ohio was like "way back when." Cigarette box favors were presented by Anchor Hocking Glass Corporation, Lancaster, Ohio.

Dr. F. E. Deatherage, program chairman for the Columbus meeting, was complimented by the entire group for sponsoring the best meeting, to date, of the Ohio Valley Association of Food Technologists, and the entire group is extremely grateful to the Columbus group, Ohio State University, and Battelle Institute for this fine meeting.

DAN RIDENOUR, *Secretary.*

Book Review

FOOD PLANT SANITATION, by Milton E. Parker, Counselor in Food Production Development, McGraw-Hill Book Company Incorporated, 1948, 447 pages. Price $6.00.

This new volume on sanitation is one of a series in the publisher's "Series In Food Technology." Publication of this book is the first serious attempt to meet a widespread need in the food manufacturing industry. Previous to this, no one has attempted to correlate in one volume all of the wealth of data on the very broad field of food plant sanitation. Indeed, outside of the dairy industry, there have been few if any attempts to put down in written form either the facts involved in food plant sanitation or the methods for maintaining a high level of sanitation in such plants.

The author and publisher are to be commended for making this attempt, and it should be recognized that they had little if any guidance as to what was needed in the form of a generalized text in this field. It is an extremely diversified field ranging from establishments interested primarily in factors of bacteriological cleanliness, such as is the case in the dairy industry, to those interested primarily in insect and rodent infestation and methods for their elimination as exemplified by the milling and other industries.

The book consists in large part of paraphrases and credited quotations from leading authorities in each food field who have written concerning various sanitation problems. The sections involving the fields in which the author is known to have contributed personally are apparently written on his own authority and are very effective. Because of the major importance of the personnel problem in food plant sanitation, three chapters have been devoted to this field to good effect. Anyone reading the chapters on "Establishment and Development of Sanitary Practices," "Employee Training and Sanitary Practices," and "Maintaining Sanitary Practices" should get a good start in organizing personnel for a sanitation program.

In fields in which the author is apparently not personally experienced, there is not as much "meat." For example, in considering the legal aspects of food plant sanitation, rather little is said about a great deal, and too much about points of relative unimportance. A whole page is devoted to authenticating the contention that a member of the official governing board or an officer of a food plant corporation is personally responsible. This is very commonly known as having been substantiated by court decision and it is not believed to any great advantage in a text of this character to spend pages quoting the legal documents. The book is behind the times in its information in this field. For example, it has failed to recognize that the Food, Drug, and Cosmetic Act of 1938 is now enforced by the Federal Security Agency, rather than by the U. S. Department of Agriculture, and also neglects to discuss the new amendment now making it possible for the government to seize improperly stored food products that have become adulterated while still in interstate commerce but after shipment by the original manufacturer. This action revolves about the well-known Phelps-Dodge decision and was passed before this book went to print. Discussion of this clarification and extension of the law very definitely should have been included.

The sections on rodent and insect control are not as authoritative and informative as they could have been had the author apparently not relied too much upon other authorities and unpublished reports. For example, on page 189 there is a discussion on DDT Aerosols having proved effective against flies. This is true for Aerosols in general, not particularly DDT. The efficacy and great use of DDT in control of flies has depended upon its residual action. There is not sufficient emphasis in the chapter on insect control upon the great extension to insecticide use given by the discovery of the principle of residual sprays. Whether or not future work shows the toxicity of DDT, Chlordane, and other residual spray materials now in use to be too great to merit their application in a food plant, the fact remains that the principle of depositing insect toxic residual surface in appropriate places is a great advance in food plant sanitation. This principle is being fought by a great many manufacturers of old-time competitive products. Too much emphasis is given in the chapters on insect control to the type of products marketed by these manufacturers of competitive products and their claims for them.

The chapter on rodent control contains even a larger number of statements which are hearsay and attributable to well known manufacturers or distributors of rodent control substances. For example, on page 223, there is considerable discussion of a bait including Vitamin E as wheat germ oil which allegedly affords a particular attraction for rats. Whether or not this statement has factual support in literature is open to question. Extended research on the part of biologists has failed yet to disclose any bait or poison which forces a rat to leave the premises to die because of suffocation. Rats tend to go to their homes when sick. If their nests or homes are within the plant, it is there that they will take refuge, not outside the plant. On page 225, some discussion is made of "Castrex" by its technical name. This substance is not a good rodenticide. A statement is also made that ANTU can only be used by responsible and qualified persons. This is true of "1080," not of ANTU. ANTU is sold generally throughout the country and is recommended as a substitute for Red Squill in the case of the Norway rat. It is valueless with regard to other rats and mice. There is also included a discussion on rodent deterrents, the information contained in which has not been substantiated scientifically.

In the opinion of the reviewer, the writer is to be commended for attempting to bring out an overall food plant sanitation text. He has done a good job, although this book can not be relied upon as an authoritative reference book. It is merely a thorough discussion of subject matter that has previously been generally available only in individualized pamphlet form, but the information has always been weighed against its source. It is hoped that readers of this book will not rely upon such biased information without weighing it where credited against its commercial origin. Unfortunately,

not all such questionable material is credited as shown by the examples given above. EDWARD L. HOLMES.

AQUAMETRY. APPLICATION OF THE KARL FISCHER REAGENT TO QUANTITATIVE ANALYSES INVOLVING WATER, by John Mitchell, Jr., and Donald M. Smith, of E. I. du Pont de Nemours, Inc., Wilmington, Delaware. Interscience Publishers, Inc., New York, 1948, 444 pages. Price $8.00.

The determination of moisture has always been of major concern to all who buy or sell materials on specification, and in particular to quality control and production control men in the food processing industries. Now at last a book has been published with detailed discussion of the theory and procedures for the rapid and accurate determination of water by volumetric titration with Karl Fischer reagent. The name "Karl Fischer Reagent" has become generally accepted for a solution of iodine and sulphur dioxide in pyridine and methanol, first developed in 1935 by Karl Fischer, applications of which have been found in many fields of analytical work. The methods are rapid, and reproducible results compare well with those of official methods. Karl Fischer titrations may take 10 minutes to one hour for a series of determinations; while, for example, the Bidwell-Sterling method or the oven drying methods may require two to six hours. No additional indicator is needed, as the Karl Fischer reagent itself is a most sensitive colorimetric indicator. As long as water is present, the iodine color of the reagent is dissipated. When all the water has reacted, the iodine color persists.

The book is divided in two parts. The first part deals with the specific quantitative determination of water. One chapter discusses the chemical nature of the Karl Fischer reagent, another gives details regarding titrimetric procedures for using the reagent, while other chapters are concerned with determination of water in organic compounds and commercial organic materials, including fats and oils, foodstuffs, petroleum products, and naval stores. Those few compounds or classes of compounds which may interfere with the determination are thoroughly discussed and procedures given for their removal or for rendering them inert. The second part of the book deals with organic reactions involving liberation or consumption of water, showing some applications of the Karl Fischer reagent to quantitative determination of organic functional groups, such as alcohols, carbonyl groups, carboxy acids, amines, acid anhydrides, and nitriles.

A good bibliography, footnoted directly within the individual chapters, makes it easy to refer to original articles for more detail on any phase of the work. The organization of the material and its arrangement within the divisions and chapters make it readily useful as a laboratory reference manual. The reviewer has no doubt that this book with its compilation of methods and discussion of theory will bring about many changes or at least a shift in emphasis in analytical laboratories. This book should be of particular value to the men who control quality and production in the food industries, and should prove an invaluable addition to every technical library. RALPH C. ZALKAN.

Abstracts

(Continued from page 6, preceding Editorial)

ascorbic acid content is that when the final product is reconstituted, it is more concentrated than the fresh juice and, therefore soluble solids and ascorbic acid are higher.

137I. Where do frozen concentrates go from here?

Quick Frozen Foods, 11, 47-9, Nov., 1948.

Concentrates have taken 12% of the market from canned products. The big three are, Birds Eye, Snow Crop., and Minute Maid, with 90% of the market. Quality is holding up and a brilliant future is predicted.

138I. Utility of high frequency heating in the frozen food industry.

BARTHOLOMEW, J. W. *Quick Frozen Foods, 11,* 59-61, Nov., 1948.

The metal and plastic industries are using high frequency heating, but there are few installations in the food field. The possibilities in part are: (1) inactivation of enzymes, (2) thawing of frozen foods, (3) continuous pasteurizing in 5-15 seconds, (4) inactivation of molds on baked goods, (5) inactivation of insect eggs, (6) cooking of foods, and (7) sterilization of canned foods. Mention is also made of the high cost of installations, their unadaptability to other than the prescribed operation and certain technological difficulties.

MILK AND DAIRY PRODUCTS

139I. Manufacture, use and storage of dehydrated sweetened condensed skimmilk.

MUSSETT, A. T., AND MARTIN, W. H. *Ice Cream Tr. J., 44,* 54, Dec., 1948.

Twelve small lots of powder were made in an experimental drier under the different conditions being studied. In the phase concerning manufacture, the factors studied were the temperature in the drying chamber, atomizing pressure and degree of concentration of the liquid to be dried, and their effects upon moisture content, flavor, color, and texture of the finished product. A total of 33 mixes were made and frozen to obtain data on the suitability of sweetened powders in ice cream. From the standpoint of acidities, mixes containing sucrose sweetened powder produced results which were more desirable than the control mixes, while mixes containing maltose sweetened powder resulted in acidities which were high. Observations made on the ease with which the different powders were incorporated into the mix indicated that sucrose and maltose sweetened skimmilk powders were more easily and completely dispersed in the mix than was either skimmilk powder or the pulverized skimmilk powder-sucrose mixture. The best results were obtained when sweetened skimmilk powders were stored for two months in glass or tin containers at either room temperature or 40° F.

140I. The manufacture of a high quality chocolate milk drink.

FORBES, B. P. *Southern Dairy Products J., 44,* 42-3, July, 1948; *J. Dairy Sci., 31,* A139, No. 362 (1948).

Cocoa powder rather than chocolate is used in the preparation of chocolate milk drinks. The necessity for scrupulously observing the rules prescribed by the flavor manufacturer is obvious. In using reconstituted milks, the solids should be the same as in fresh milk. Settling may be caused by: insufficiently stabilized cocoa; too much milk or insufficient butterfat content; dilution of dairy drink by milk or water; restriction of valves on pressure side of pumps, causing a homogenizing effect or excessive whipping by centrifugal pumps; too acid milk (do not neutralize); using soda-neutralized milk; using frozen milk; incorrect pasteurizing and cooling; insufficient heat or too short holding time; over-agitation during and after cooling; powder not entirely incorporated; not cooled to 40° or lower; precooling below 140° in the vat. Thickening may be caused by excessive pasteurizing temperature; overstabilization; use of lime or magnesium stabilizers; improperly rinsed bottles; milk which is too acid.

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Selected Abstracts

ANALYTICAL METHODS

141I. A study of the behavior of some sixty amino acids and other ninhydrin-reacting substances on phenol-"collidine" filter-paper chromatograms, with notes as to the occurrence of some of them in biological fluids.

DENT, C. E. *Biochem. J., 43,* 169-80 (1948).

The two-dimensional filter paper method of partition chromatography has been applied to some 60 amino acids and other ninhydrin-reacting substances using the pair of solvents phenol and 'collidine'. A map is shown giving the positions taken up by these substances on the paper square. With additional tests, the method can be applied to the identification of all ninhydrin-reacting substances likely to be present in biological fluids. The ninhydrin color reaction as used is positive for many aliphatic amines and also for β, γ, and ϵ amino acids.

142I. Paper chromatography of the noble metals.

LEDERER, M. *Nature, 162,* 776-7 (1948).

Cations can be separated successfully if the solvent is adjusted suitably to prevent hydrolysis. The solvent selected for study was butanol saturated with N aqueous HCl. The separation of gold, platinum, palladium, copper and silver is described, which in the ordinary method of fire assaying is a tedious process, and, owing to the small amounts available for analysis, is an example where paper chromatography is eminently superior to chemical methods of analysis.

143I. A new method for the separation, detection and estimation of inorganic compounds.

ARDEN, T. V. et al. *Nature-Supplement, 162,* 691-2 (1948).

The technique is essentially paper partition chromatography. The essential feature is the combined use of an organic solvent (generally containing some acid or other reagents), and an adsorbing material such as cellulose, for separation of inorganic substances.

144I. Determination of lactose alone and in the presence of sucrose by the method of Munson and Walker.

HAMMOND, L. D. *J. Res., 41,* 211-21 (1948).

The existence of uncertainties in the tables employed in the determination of lactose, alone, and in the presence of sucrose, by the method of Munson and Walker, has led to the redetermination of the reducing-sugar values from which these tables were calculated. The original tables were based on the weights of cuprous oxide corresponding to various weights of lactose, and in the present paper, all values are referred to the weights of copper determined electrolytically. Data showing the magnitude of the contamination of the cuprous oxide under the conditions prevailing in the method are given. The table of Straughn and Given for mixtures of lactose and sucrose in the ratio of 1:12 is shown to be in error. From the redetermined values, an extensive table of the copper values for lactose and for two ratios of lactose and sucrose has been computed.

145I. Report of the color committee—spectrophotometric color grading.

J. Am. Oil Chem. Soc., 25, 271-6 (1948).

Investigations of spectrophotometric measurement of oil colors have been made with the aim of replacing the Lovibond color system. Satisfactory results have been obtained in several laboratories, using a Coleman spectrophotometer. Single color density readings at 5.50 mμ, using a 25 mm. cuvette and carbon tetrachloride as a comparison medium, fall in a straight line when plotted against Lovibond values. Results may thus be translated from one system to the other. Dark samples may be diluted to enable measuring. A tentative method is presented.

146I. A stability test for vitamin A in fish oil. II.

SWAIN, L. A. *Fish. Res. Bd. Canada. Pac., No. 77,* 116-17, Dec., 1948.

Stability was determined by (a) air-bubbling of hot oil method and (b) the filter paper method. The relative stabilities of the oils were different by the two methods. In the air-bubbling method, the methylene chloride-extracted oil took exactly 3 times as long for 50% loss of vitamin A as did the alkali-steamed oil. By the filter paper method, it took only about 1.5 times as long.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

147I. Secretion in cow's milk of intravenously injected radioactive phosphorus P32.

KLEIBER, M., SMITH, A. H., AND RALSTON, N. P. *Proc. Soc. Expt. Biol. Med., 69,* 354-6 (1948).

Cows injected with 15 and 30 millicuries of P32 produced "hot" milk almost immediately. Peak reached about five hours after injection. One week later, milk still contained slightly over 0.1% of the injected P32 per liter.

148I. Studies in detoxication. 17. The fate of catechol in the rabbit and the characterization of catechol monoglucuronide.

GARTON, G. A., AND WILLIAMS, R. T. *Biochem. J., 43,* 206-11 (1948).

At dose levels of 100 mg. per kg. 70% of orally administered catechol is excreted in 24 hours conjugated with glucuronic acid, and 18% conjugated with sulfuric acid. A small amount, approximately 2%, is excreted in the free state. The catechol glucuronide has been proved to be a monoglucuronide by conversion into crystalline o-methoxyphenyltriacetylglucuronide methyl ester which on hydrolysis yields guaicol.

149I. Effect of acid hydrolysis on the retrogradation of amylose.

WHISTLER, R. L., AND JOHNSON, C. *Cereal Chem., 25,* 418-25 (1948).

Potato amylose retrogrades from aqueous solutions more slowly than amyloses from corn and wheat starches. On acid

(Abstracts continued on page 6, following technical papers)

COURSE IN FOOD PACKAGING

A sixteen-weeks course in food packaging and methods was opened in the Graduate School of the Illinois Institute of Technology on February 16th. The course is directed by Lee Hickox, Vice-President of Container Laboratories, Inc., Chicago. A lecture is given each Wednesday evening from 6:20 to 8:00 o'clock. Final examination will be held on June 8th. Subjects of lectures to be given after March 15th are "Packaging Food Products by Vacuumizing the Package," "Packaging Food Products by Heat Sterilization in the Package," "Paperboard and Its Uses in Food Packaging," "Flexible Barriers," "Bags," "Shipping Containers," "Major Food Packaging Components," "Food Packaging and Its Relationship to Packaging Machinery," "—To Plant Layout," and "—To Plant Sanitation," "Testing Food Packages," "Frozen Food Packaging," "Packaging Cereal Products," "Merchandising and Functional Aspects of Packaging," and "Organization and Operation of the Package Department."

S. A. B. MEETING

The Society of American Bacteriologists will hold its 1949 annual meeting May 16-20 in Cincinnati, Ohio. The headquarters hotel will be the Netherland Plaza. The program will include papers relating to all types of bacteriology, such as agricultural, dairy, dental, food, general, industrial, medical, public health, sanitary, veterinary, soil, etc.

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Regional Section News

CHICAGO SECTION

On March 21, Dr. G. H. Benham, Associate Professor of Biochemistry of the Illinois Institute of Technology, presented to the Chicago Section the subject "Significance of Man's Dietary Habits to Food Technologists."

Dr. L. A. Hall, a member of the Program Committee for the annual I. F. T. Conference in San Francisco next July, reports that the industrial and production section of the program has been completely filled.

Frank M. Beegle, chemical consultant and President of Protective Coating Corp., Des Plaines, Ill., died at his home on February 22. He was a member of the American Institute of Chemists, the American Chemical Society, the Chemical Arts Forum, and a national member of the Institute of Food Technologists.

NORTHERN CALIFORNIA SECTION

The June meeting of the Northern California Section is scheduled for June 9 and will be devoted to matters pertaining to the National Meeting in July.

The annual meeting of the Section is planned for December 1. It will be an all-day session devoted to research papers contributed by members.

Professor W. V. Cruess, who was injured in an accident on his ranch, is now sufficiently recovered to be discharged from the hospital and to be up and around with the aid of a brace. He even reports to his office for brief periods. He has our best wishes for his continued recuperation.

DeWitt F. Sampson, Assistant Manager of the American Can Company's Pacific Research Division, is being transferred about June 15 to the Central Laboratory at Maywood, Illinois, as Section Chief. His place is being filled by Dr. John M. Jackson, Assistant Section Chief at the Maywood Laboratory and currently Secretary of the Chicago Section of I. F. T.

At the meeting of the Section on April 21, Edwin L. Mitchell of the Richmond-Chase Co., attired nattily in a red and white checkered gingham shirt and blue denim jeans, was introduced as the fashion note for the National Convention barbecue. Members were asked to take notice and wear similar clothes to provide atmosphere at the barbecue.

At the meetting of the Section on June 9 in San Francisco, the membership was briefed on its duties at the National Convention.

NORTHEAST SECTION

As New England is an important center of chocolate and candy manufacture, the dinner meeting of the Northeast Section on March 24 was devoted to a symposium on "Problems of the Confectionery Business." Four papers were read as follows:

"Problems of the Chocolate and Cocoa Manufacturer." Mr. H. O. Frye, General Manager, Walter Baker Division, General Foods Corporation, Dorchester, Mass.

"Problems of the Coated Confectionery Manufacturer." Mr. Arthur E. Page, Production Manager, Daggett Chocolate Company, Boston.

"Problems of the Flavor Manufacturer as Pertains to the Confectionery Industry." Dr. N. C. Larsen, Research Director, Polak & Schwarz Inc., New York, N. Y.

"Problems of the Equipment Manufacturer as Pertains to the Confectionery Industry." Mr. D. S. Greer, Vice-President, J. W. Greer Company, Cambridge, Mass.

Mr. Robert L. Swaine, one of the newer members of the Section, formerly in the food department of the First National Stores and now with Arthur D. Little, Inc., was married on March 26 to Barbara E. Allen. The young people are living in Brighton.

Dr. J. A. Dunn, of the General Foods organization, who changed last July from the Diamond Crystal Salt Division to the Atlantic Gelatine Division, now has a home of his own at 7 Lewis Road, Winchester, Mass.

SOUTHERN CALIFORNIA SECTION

On March 16, following a dinner meeting, sixty members of the Southern California Section and their guests heard a talk by Dr. R. W. Hodgson, Professor of Subtropical Horticulture, University of California at Los Angeles. His topic was "The California Fruit Industry." The development of the fruit industry in California was traced, and many interesting and informative facts were given. There were also three 5-minute talks by members concerning problems relating to their particular industries. The interest of the group was evidenced by the many questions asked and the long discussion period, which followed Dr. Hodgson's talk.

ST. LOUIS SECTION

On March 23, members of the St. Louis Section met at the Hyde Park Breweries Association, where they heard a talk on "Chemical Engineering in the Food Industry," given by Mr. W. L. Faith of the Chemical Division, Corn Products Refining Company, Argo, Illinois.

NEW YORK SECTION

The March meeting of the New York Section of I. F. T. was held jointly with the New York Section of the Cereal Chemists. Mr. Joseph Jacobs talked about the problems of food manufacturers in manufacturing foods to comply with Jewish dietary laws.

At the meeting of the Section on April 20, Dr. Edy Velander, Professor and Managing Director of the Swedish Royal Academy of Engineering Sciences, spoke on "Advances in Swedish Food Technology."

PHILADELPHIA SECTION

On March 10, the Philadelphia Section held a dinner meeting, following which they were addressed by Dr. Arnold H. Johnson of the Sealtest Research Laboratories, National Dairy Products Corporation, Long Island, N. Y. Dr. Johnson spoke on "The Use of Milk Powder in the Baking Industry."

MARYLAND SECTION

On March 11, the Maryland Section met for its regular session at the Hotel Stafford in Baltimore. Following the dinner, Major John W. Schrank, Production Director of J. H. Filbert, Inc., spoke on "Processing of Fats and Oils and Their Uses in Margarine."

At a convention of the Tri-State Packer's Association held recently in Baltimore, Mr. Maurice Siegel of Strasburger and Siegel Laboratories and Vice-Chairman of the Maryland Section of I. F. T. spoke on "The Control of Spoilage Through Sanitation."

Abstracts

(Continued from page 2)

hydrolysis, the rate or retrogradation of potato amylose increases to a maximum, and then continuously decreases. Corn amylose, though lying nearer the maximum rate of retrogradation, goes through a similar increase and decreases in rate of retrogradation when its molecular magnitude is decreased by hydrolysis. For both amyloses maximum retrogradation seems to occur at viscosities of η sp/c of about 0.5.

150I. Influence of autoclaving dry peas on some properties of the proteins.

EVANS, R. J., AND ST. JOHN, J. L. *Cereal Chem., 25,* 377-85 (1948).

The influence of autoclaving dry peas on the peptization and digestibility of the protein has been determined. The percentage of nitrogenous compounds peptized by different salt solutions was decreased by autoclaving the peas, particularly when drastic autoclaving was employed. The liberation of amino groups by *in vitro* enzymic digestion of dry peas was decreased by autoclaving, as was the liberation of methionine and lysine by *in vitro* trypsin and erepsin digestion.

MICROBIOLOGY

151I. Paper and paper board in the food industry — public health aspects.

TANNER, F. W. *Am. J. Public Health, 38,* 1688-93 (1948).

Coliform bacteria are absent in the pulp stream in paper mills and in finished paper. Bacteria are destroyed in paper mills by pulping under pressure with chemicals, bleaching with strong chlorine, and passage over drier rolls heated to high temperature. Many species die out in paper because of lack of moisture. Only aerobic spore-bearing bacteria survive. A bacterial count standard such as has been proposed for finished paper is of no value for determining sanitary quality of paper.

152I. Factors of sewage pollution of oyster beds in Galveston Bay.

WISE, R. I., WINSTON, J. B., AND CULLI, G. *Am. J. Public Health, 38,* 1109-17 (1948).

Coliform content of oysters and water above oyster reefs in Galveston Bay, Tex., decreased in the spring, remained low from July to December, and increased to high values in January. Oysters usually showed greater pollution than the water. The total volume of water entering the bay each month correlated with the degree of pollution. Water turbidity varied directly with the water volume and directly with coliform content.

153I. Preventing stream pollution.

WISNIEWSKI, T. F. *Food Packer, 30,* 62-4, Jan., 1949.

Wisconsin is cracking down on canners. The Committee on Water Pollution employs field men for experimentation. Continuous flow, fill and draw chemical precipitation processes were developed. Biological, sand and carbon filtration, and effects of wastes on municipal systems have been investigated. Field men help the canners select the method most suitable for their type of operation. Lagooning and irrigation are most common where possible.

NUTRITION

154I. Fat in feeds.

HUNTER, J. E. *Flour and Feed, 48, 26-27* (1948); *Comm. Fish. Abst., 2,* 11, No. 6.19, Jan., 1949.

A great amount of work has been done on the fat requirements of poultry and there is nothing in the literature to indicate that poultry needs much fat. A review of this work is presented. Considering the ingredients commonly used in poultry feeding, both the poultryman and the feed manufacturer can forget about the fat requirement of the chicken, for in any practical ration, the fat will fall within safe limits.

155I. Yeast for animals.

Ind. Bull., No. 250, 3-4, Jan., 1949.

Production of commercial yeast from pulp wood waste, sugar-mill residue, canning wastes, pear waste and wood sugars is discussed. All of these industries are in their infancy, but are potential sources of food yeasts both for the nutrition of humans and animals. Their principal use is expected to be in prepared animal feeds where they supply proteins and vitamins and result in increased milk production and increased rates of growth. About 15,000 tons of dry yeast are produced annually which is an increase of 400% over prewar production. Use of industrial waste in the production of yeast would materially lessen the stream pollution problem now existent.

156I. Algae may avert famine.

SPOEHR, H. A., AND MILNER, H. W. *Sci. N. L., 55,* 6, Jan. 1, 1949.

The microscopic freshwater alga, Chlorella, may become a source of food supply for world populations of the twenty-first century. Under controlled conditions, Chlorella is capable of producing as much as half its weight as protein, or up to three-fourths its weight as fat. Only mineral salts, water, and sunlight are needed for growth.

157I. Trypsin inhibitor. VIII. Growth inhibiting properties of a soybean trypsin inhibitor.

BORCHERS, R., ACKERSON, C. W., AND MUSSEHL, F. E. *Arch. Biochem., 19,* 317-22 (1948).

A partially purified trypsin inhibitor was prepared from raw soybean oil meal by acid extraction, simultaneous papain digestion and partial precipitation and purification with $(NH_4)_2SO_4$. This inhibitor preparation had no effect on the growth of chicks or rats.

158I. The effect of heat on the nutritive value of lactalbumin. I. Growth on diets containing heated proteins.

DAVIS, R. M., RISSO, P., AND SMITH, A. H. *J. Nutr., 37,* 115-26, Jan., 1949.

The nutritive value of lactalbumin is diminished by heating the protein. This decrease appears to be the result of lowered digestibility due to a change in the linkages between the amino acids, which renders them less susceptible to enzymatic hydrolysis.

159I. Self selection of diet. IX. The appetite for thiamine.

SCOTT, E. M., AND VERNEY, E. L. *J. Nutr., 37,* 81-91, Jan., 1949.

Rats suffering from thiamine deficiency show a preference for diets containing as little as 0.1 and as much as 1000 p.p.m. of thiamine. The appetite for thiamine-containing foods was not universal in thiamine deficient rats, and a small minority always made a poor choice. Rats fed a critically low concentration of thiamine were in better condition than rats offered a choice between this diet and a thiamine-free diet. Appetite for thiamin-containing foods was not established until the animals were distinctly deficient as judged by weight gain and food intake. It was concluded that while learned appetite for thiamine can lead to better nutrition than would wholly random eating, it can, at best, only approach the benefit obtained by obligatory eating of a diet prescribed on the basis of known requirements.

160I. Nutritive value of canned foods. Effect of time and temperature of storage on vitamin content of commercially canned fruits and fruit juices (stored 18 and 24 months).

SHEFT, B. B. et al. *Ind. Eng. Chem., 41,* 144-5, Jan., 1949.

During the first 12 months of storage, elevated storage temperatures accelerated losses of ascorbic acid and thiamine more than did extended storage periods. This was evident in the warehouse samples as well as in those stored in constant temperature chambers. Carotene retentions in tomato juice

were excellent throughout the storage period. In whole tomatoes and in peaches, losses were greater after storage for 24 than for 18 months. Retentions of niacin were excellent in peaches and good in tomatoes and tomato juice stored for two years. Riboflavin was retained very well in tomatoes and tomato juice.

161I. Biological examination of the influence of drying on the nutritive value of the nitrogen-containing substance in feed and foodstuffs.

ZIMMERMAN, G. *Mitt. Gebiete Lebensm. Hyg., 39,* 71-88 (1948); *Comm. Fish. Abst., 2,* 13, No. 6.139, Jan., 1949.

The nutritive value of the protein in milk, casein, meat, grains, peanuts, fish meal, cottonseed meal, and grass decreases by heat-drying, while the protein of legume seeds, particularly of soybeans, improves up to a certain temperature. The biological value of N in feed and foodstuffs is characterized by 3 data, the true digestibility, the biological valence, and the N-net value. With the exception of legumes, the nutritive value of N decreases as the drying temperature and time increases, especially when the material is already dehydrated. Feeding experiments with rats were carried out to determine, by means of the 3 data, the influence of drying time and temperature on the N-contg. substance of air-dried lucerne leaves (alfalfa). In an attempt to explain the experimental results, it was suggested that, under the influence of increasing temperatures, proteolysis-preventing substances are formed which decrease the digestibility of N-containing food, or structural changes may occur so that the absorbability of certain essential amino acids is decreased or prevented.

FOOD PRODUCTS

CEREALS AND GRAINS

162I. Corn germ removal.

SINGER, P. A., AND DEOBALD, H. J. Assignors to Allied Mills, Inc. *2,459,548.* Jan. 18, 1949.

The method which comprises supplying only sufficient water to corn to bring the moisture content thereof to 20-30% by weight, maintaining the corn in the presence of the added moisture for a short period sufficient to distribute the moisture substantially uniformly through the corn, cracking the corn to loosen the germ, supplying additional moisture to the corn to form a starch liquid, violently agitating the corn in the presence of the added moisture to produce a starch liquid having a higher specific gravity than that of the corn germ, and separating the germ by flotation from the corn in the presence of the starch liquid.

FISH

163I. Amino acids in fishery products. II.

DEAS, C. P., NEY, P. W., TARR, H. L. A. *Fish. Res. Bd. Canada. Pac.,* No. 77, 97-9, Dec., 1948.

Fish meals, stickwaters, condensed fish solubles, waste waters, eggs, milts were analysed for amino acids. Fish meals showed the best overall source of essential amino acids.

FLAVORINGS

164I. Vanilla bean culture.

Ind. Bull., No. 247, Oct., 1948.

The recent discovery by Knudson of Cornell of how to make vanilla seeds germinate is expected to lead the way to solving many problems in vanilla culture. The new method offers hope that new strains of the plant may be developed which will be resistant to vanilla root rot which now limits the life of a vanillary to about 7 years.

MILK AND DAIRY PRODUCTS

165I. Factors to consider in making high quality chocolate milk drinks.

THACKER, W. C. *Southern Dairy Products J., 43,* 102-3, 116, July, 1948; *J. Dairy Sci., 13,* A140, No. 363 (1948).

Six desirable characteristics for chocolate milk or chocolate drinks: (a) High quality milk or part-skimmed milk. The minimum fat standard for whole skim milk should be met; (b) Mild chocolate flavor. The amount of flavor used ranges from 1.0 to 1.5% cocoa or 1.5 to 2.25% liquor chocolate; (c) Little or no sedimentation with a low to medium viscosity. Special finely-ground cocoas are on the market, and sodium alginate will prevent sedimentation at a low viscosity. Homogenization increases sedimentation; (d) Elimination of the ragged dark-colored cream layer. This can be prevented by pasteurization at 160 to 165° F. for 15 to 30 minutes and the addition of stabilizers; (e) Light to medium red-brown color; (f) Medium to high sweetness. Consumer demands differ from about 5 to 8% sugar. Standard composition and processing methods are important.

166I. Lactating factors for dairy cows in dried grapefruit peel.

DAVIS, R. N., AND KEMMERER, A. R. *J. Dairy Sci., 31,* 973-5 (1948).

Four pounds daily of dried grapefruit peel added to an alfalfa hay ration increased milk production. An equal amount of a grain mix did not maintain this increase. Supplementing a ration of alfalfa hay and concentrate mix with oat pasture definitely increased milk production. It is concluded that dried grapefruit peel contains factors which stimulate milk production in dairy cows.

PECTINS—JAMS AND JELLIES

167I. Tamarind-seed jellose ("pectin"): its jellying properties.

RAO, P. S. *J. Sci. Ind. Res. India, 7,* B 89-90 (1948); *Brit. Abst., BIII,* 387, Nov., 1948.

Tamarind-seed jellose differs from fruit pectins in not being a Me ester of polygalacturonic acid but a carbohydrate composed of xylose, galactose, and glucose. Nevertheless it has good jellying properties, which depend on: (1) sugar concn., for which the optimum val. is 65-70 g. per 100 ml. (115 g.) of the jelly; (2) jellose concn., which should be 0.7-0.9% on the wt. of the final jelly compared with 0.2-1.0% in the case of fruit pectins; (3) the pH of the medium, which may vary from 1.8 to 9.8 for tamarind-seed jellose in contrast with fruit pectins which do not form jellies at pH>4 and give optimum results at pH 2; and (4) temp. and duration of heating, which adversely affect jellying by fruit pectins, with the loss of ~ 1/3 of their original jellying power after boiling for 1 hr., whereas tamarind-seed jellose is unaffected by boiling in aq. solution for 2 hr. Firm, transparent jellies are prepared from tamarind-seed jellose by wetting 0.8 g. with EtOH, adding 65 ml. of H_2O bringing to the boil, adding 65 g. of sugar, and reducing the wt. of the solution to 115 g. by boiling for ~ 10 min. The strengths (by Baker's method, B., 1926, 213) of jellies prepared from tamarind-seed jellose, and orange, guava, and apple pectins were 100, 65, 40 and 35, respectively.

168I. Cold processed fruit spread.

JOHNSON, G., AND BOGGS, M. M. Assignors to the United States of America as represented by the Secretary of Agriculture. *2,459,431,* Jan. 18, 1949.

A process of preparing gelled fruits in which a fruit of the group consisting of fruit juice, pureed fruit, pureed fruit containing crushed fruit, and pureed fruit containing sliced fruit, is mixed with an amount of powdered high methoxyl pectin not to exceed 1% of the finished product by weight, and with an amount of sugar such that the mixture at this stage does not contain in excess of 30% of soluble solids by weight; stirring the mixture at room temperature until the pectin is hydrated; adjusting the pH of the mixture to 3.5 or below by adding a fruit acid, when the pH of the mixture is about 3.5; then adding more sugar in an amount to total 40 to 55% of added sugar and to result in a finished product having from 45 to 60% of soluble solids, the mixture being allowed to stand at about 70° F. to 100° F. until gelled.

VEGETABLES

169I. Research on harvesting, transportation and storage of potatoes—a review of recent literature.

LUTZ, J. M., WRIGHT, R. C., AND EDGAR, A. D. *Am. Potato J., 25,* 437-45 (1948).

Comparative studies in the field of sprout inhibitors show that the use of the methyl ester of naphthalene acetic acid, or maintenance of atmosphere of 10.5 percent CO_2 and 13.6 percent

O_2, were efficient. Serious losses in ascorbic acid content occur during storage. The ascorbic acid content varied with varieties, seasons, and within the same varieties. Harvesting time, type of culture, temperature in storage, and amount of water used in cooking were all found to have an effect on the ascorbic acid content. There is a correlation between specific gravity of the raw product and the mealiness of the cooked product. Potatoes with high specific gravity gave a larger yield of the dehydrated product.

PHYSICAL CHEMISTRY

1701. Distribution of molecular weights of pectin propionates.

OWENS, H. S., MIERS, J. C., AND MACLAY, W. D. *J. Colloid Sci., 3,* 277-91 (1948).

A number of pectins have been esterified to form the corresponding propionates. These compounds are readily fractionated according to molecular weights by formation of a saturated solution in a suitable solvent system at a high temperature, followed by reduction of the temperature and repetition of the operation several times. The molecular weight of the individual fractions has been measured and it was found that viscosity- and weight-average molecular weights of pectin propionates are identical.

1711. A metastable state of gelatin obtained by desiccating it at an elevated temperature.

PINOR, R., AND POURADIER, J. *Compt. Rend., 227,* 190-2 (1948); *Chem. Abst., 42,* 7604[a], (1948).

Dry gelatin prepared by exaporating solutions for 2 to 4 hours at 60° C. had the following properties: (1) more brilliant surface than gelatin from solutions that had gelled, (2) went into solution with practically no swelling, (3) dissolved at a lower temperature than gelatin from solutions that had gelled, (4) lower melting point than ordinary gelatin, (5) solutions set to rigid gels. It is believed that gelatin prepared in this manner is unimolecular and free from association.

1721. Age of eggs revealed by color under ultraviolet light.

WILSON, W. R. *Sci. N. L., 54,* 135 (1948).

Old eggs appear purple in color, while really fresh ones glow scarlet in ultraviolet light. Oxidation causes a chemical change in the shell which results in the color switch.

Book Review

ADVANCES IN FOOD RESEARCH, VOLUME I. Edited by E. M. Mrak, University of California, Berkeley, California, and G. F. Stewart, Iowa State College, Ames, Iowa. Academic Press, Incorporated, New York, New York, 1948. 459 pages. Price $7.50.

The initial volume of a series designed to "provide a medium in which every phase of food research may be exhaustively and critically reviewed on a continuing basis." For future volumes the editors, and an editorial board of eleven eminent scientists in the field of food research, will seek more contributions which are "exhaustive, critical, integrating, and of fundamental importance to the development of food research as a whole."

Volume I contains ten contributions. Five reviews are on specific commodities: 1. Factors affecting the palatability of poultry, 2. Physiology and chemistry of rigor mortis in beef, 3. Deterioration of processed potatoes, 4. Nonenzymatic darkening of fruit products, 5. Factors influencing the shelf life of dried whole eggs. The other five reviews are on general subjects: 1. Factors influencing the vitamin content of canned foods, 2. The physiological basis of voluntary food intake, 3. Factors influencing the vitamin and mineral content of vegetables, 4. Microbial inhibition by food preservatives, 5. High-polymer pectins and their deesterification.

Each contribution is a complete coverage of the subject matter from a technical viewpoint, including a historical review and a compilation of the recent advances. Investigators familiar with the subject matter of a particular review may find too large an emphasis on the historical facts.

This and future volumes will be an excellent source of information on fields of food research which are not sufficiently broad to warrant publication by themselves in book form.

WALTER A. MACLINN.

BIOCHEMICAL PREPARATIONS SERIES. John Wiley & Sons has announced a new series of annual volumes on the preparation of biochemical compounds to be known as the "Biochemical Preparations Series." Volume I, edited by Herbert E. Carter of the Department of Chemistry, University of Illinois, was published on February 15.

The series will be similar in organization to the well-known Wiley "Organic Syntheses Series" and will perform the same function for biochemists as "Organic Syntheses" performs for organic chemists. New volumes in the "Biochemical Preparations Series," incorporating the latest information in the field, will appear at yearly intervals. As in the "Organic Syntheses Series," the preparations in each volume of the new series are subjected to laboratory checks under standard conditions to insure the accuracy of methods presented. In addition, preparations already included in biochemical literature are reworked for accuracy and clarity before publication in "Biochemical Preparations."

NEW COURSES AT THE STATE COLLEGE OF WASHINGTON

Three new courses have been added to the schedule of studies in *Fruit and Vegetable Products and Food Processing* of the Department of Horticulture at Washington State College, as announced in the new 1949 *Annual Catalog*.

Two of these courses cover advanced instruction in canning, freezing and other food processing operations, as well as quality control and food inspection. Basic physical, chemical and microbiological principles are emphasized. The third is a seminar course for seniors and graduate students; here students and faculty will get together for critical reviews and discussion of recent advances in food technology.

Instruction of the new courses will be under the direction of Dr. C. L. Bedford and Dr. Edward Ross, assisted in the laboratory by Mr. Gail Norton.

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Selected Abstracts

BIOLOGICAL SCIENCES

BIOCHEMISTRY

173I. Starch-iodine complexes. I.

GILBERT, G. A., AND MARRIOTT, J. V. R. *Trans. Faraday Soc., 44,* 84-93 (1948).

A method has been devised for the accurate potentiometric titration of starch with iodine, and used to investigate the nature of the complex formed between amylose and iodine in dilute potassium iodide solution. When the activities of iodine and iodide lie between certain limits and the percentage absorption is very low, amylose is found to be associated with a molecular ion of composition (I'_3) formed by the adsorption of three iodine molecules and two iodide ions. In general, for a given iodide concn., the number of iodine molecules in the complex increases from two to three, four, etc., with increase of iodine activity; if the iodide concentration is increased, the complex tends to $(I'_3)_n$. As first formed, the amylose-iodine complex is metastable, a very slow change subsequently taking place to a more stable form. By measuring the dependence on temperature of the equilibrium constant of the latter, its formation from iodide ions and molecular dissolved iodine is shown to be accompanied by the emission of 11.2 kcal. per mol. of iodine. It is suggested that the complexes formed by red-staining starches contain less than eight atoms of iodine and iodide per molecule.

174I. The absorption of ammonia from the rumen of the sheep.

MCDONALD, I. W. *Biochem. J., 42,* 584-7 (1948).

Evidence is presented that ammonia is absorbed from the rumen. Ammonia derived from deamination of protein of feeds contributes an important fraction of the nitrogen of ruminal ingesta.

175I. Effectiveness of vitamin P compounds in counteracting anticoagulant action of dicoumarol.

MARTIN, G. J., AND SWAYNE, V. *Science, 109,* 201-2 (1949).

D-catechin and rutin counteract dicoumarol while hesperidin does not. Ascorbic acid counteracts dicoumarol and acts synergistically with D-catechin in this respect.

MEDICINE

176I. Lithium chloride as a substitute for sodium chloride in the diet.

HANLON, L. W. et al. *J. Am. Med. Assoc., 139,* 688-92 (1949).

Four cases are presented in which lithium chloride caused toxic symptoms—drowsiness, weakness and generalized tremors. The death is reported of a patient in a precarious state of cardiac compensation who showed severe toxic effects following the ingestion of excessively large amounts of lithium chloride with his diet. Review of the literature reveals that very little work has been done on the pharmacology of the lithium in recent years, and its effects on the various metabolic processes are poorly understood. Caution should be used in prescribing lithium, especially for those patients on a low sodium diet who might use it in excessive quantity. Patients using lithium should be carefully watched for the development of both acute and chronic toxic manifestations.

177I. Status of salt substitutes under the Federal Food, Drug, and Cosmetic Act.

Food and Drug Admin. Federal Reg., 14, 1033, Mar., 1949.

Poisonings have been reported from salt substitutes containing lithium carbonate. There is considerable doubt as to the safety of unrestricted use of any salt substitute in the presence of cardiovascular-renal disease and a low sodium diet. The Federal Security Agency believes that each salt substitute is a new drug within the meaning of section 201 (p) of the Federal Food, Drug, and Cosmetic Act. The interstate distribution of each salt substitute should be discontinued until a new-drug application has been filed and has become effective with respect to the substitute.

NUTRITION

178I. Activity of vitamin B_{12} in the growth of chicks.

NICHOL, C. A. et al. *Proc. Soc. Expt. Biol. and Med., 70,* 40-2, Jan., 1949.

B_{12} can replace the animal protein factor of condensed fish solubles and injectable liver preparations when orally and parenterally administered to chicks.

179I. Variations in the vitamin B_{12} content of selected samples of pork and beef muscle.

REGISTER, U. D. et al. *Proc. Soc. Expt. Biol. and Med., 70,* 167-8, Jan., 1949.

Beef samples, tested by feeding muscle as sole source of protein to female rats, contained twice as much B_{12} as normal pork sample, while abnormal pork contained only a trace of B_{12}. The variable results with pork may be due to the fact that swine are not supplied with enough B_{12} or other factors which may be produced by the microorganisms in the rumen of cattle.

180I. Minimal protein requirement for growth in the rat.

GOETTSCH, M. *Arch. Biochem., 19,* 349-58 (1948).

In a diet supplied by a mixture of polished rice, red kidney beans and casein, the protein was apparently the limiting dietary factor. Methionine was the limiting amino acid. The maximal protein efficiency occurred in diets containing 14.3, 11.9, and 9.5% protein, and was 2.3. The maximum protein efficiency of an ideal protein, under the conditions given, would presumably be 3.7.

181I. Studies on human subjects receiving highly agenized food materials.

NEWELL, G. W. et al. *J. Lab. and Clin. Med., 34,* 239-45 (1949).

Patients fed highly agenized diet did not show any clinical or electroencephalographic evidence of the development of epilepsy. The specie difference in response to agenized material may be due to difference in absorption or detoxifying mechanisms.

DETERGENTS

182I. Surface activity of biotin.

WILLIAMS, V. R., AND WILLIAMS, H. B. *J. Biol. Chem., 177,* 745-50 (1949).

Electrophoretic examination of the mobility of *Lactobacillus casei* in the presence of increasing concentrations of anionic and cationic detergents showed the former to have no effect on the mobility, whereas the latter produced a decrease, reversal, and finally stabilization of charge. In the presence of Nopalcol 6-0, a non-ionic detergent, and oleic acid and biotin, both of which were essentially non-ionized, a decrease in mobility followed by stabilization was observed. These findings were accepted as evidence that the substances were adsorbed upon the surface of the bacteria, and indicated a surface-active nature for biotin. The surface activity of biotin was confirmed by polarographic study of its effect on the copper wave.

183I. The use of surface active cations in detergency and sterilization.

SALTON, M. R. J. *Food Preservation Quarterly, 8,* No. 1, 10-15 (1948); *Comm. Fish. Abst., 2,* 21, Feb., 1949.

Alkyl-dimethylbenzyl ammonium chloride, a quaternary ammonium compound, is highly germicidal, as is cetylpyridinium chloride. The former, in fact, is bactericidal to dilutions as high as 1:100,000 and inhibitory to dilutions as high as 1:800,000. Gram-positive organisms are more susceptible to quaternary

(Turn to page 4)

FOOD TECHNOLOGY

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 2)

ammonium compounds than are the gram-negative organisms. Bacterial spores are more resistant than vegetative cells. The presence of protein material lowers the germicidal activity; thus it is essential that surfaces be cleaned thoroughly with a detergent before being treated with quaternary ammonium compounds. A solution containing two hundred parts per million of a quaternary ammonium compound was found adequate as a sanitizer for utensils in a milk plant after the equipment was properly washed. Alkyl dimethylbenzyl ammonium chloride, 1:5000, was found highly efficient as a sanitizer for eating and drinking utensils, particularly since soaps and trisodium phosphate in the concentrations used had little or no effect on the potency of the compound. Quaternary ammonium compounds have the added advantage of being non-irritant to the skin, odorless, tasteless, and non-toxic in the concentrations recommended.

ENGINEERING

184I. Equipment and construction materials.

Chem. Eng., 55, 97-128, Nov., 1948.

Discussion of the equipment and construction materials used for processing acetic acid, ammonia, cane sugar, chlorine and caustic, fatty acids, hydrofluoric acid, hydrogen peroxide, nitric acid, phenol, phosphoric acid (wet and dry process), salt, soap, sulphate pulp, sulphite pulp, sulphuric acid, whiskey. Tables are given of construction materials, their availability, and most important applications.

185I. Smoke control.

Ind. Bull., No. 251, 3, Feb., 1949.

This article describes the various types of smoke control equipment available at present and lists the limitations of each type as to type of smoke particles it will control, size of smoke particles which may be removed, cost of equipment, and cost of operation of equipment. Various types of cyclone precipitators, water spray cleaners and mechanical filters are described. Use of electrostatic precipitators and ultrasonic precipitators are suggested for dealing with extremely small smoke particle sizes. A new method has been developed at M. I. T. for cleaning up mist-bearing gases by bubbling these gases through a bed of powdered material. The most difficult range for collection of smoke particles is between 0.1 and 0.3 microns, and use of fine-grained filter papers is necessary to clean up smoke particles in this range.

FOOD PRODUCTS

CEREALS AND GRAINS

186I. Chemical composition of rice. I. Carbohydrates in rice bran and germ.

KIHARA, Y. *J. Agri. Chem. Soc. Japan, 19,* 465-66 (1943); *Chem. Abst.,* 43; 1117^e (1949).

Carbohydrates extracted from fat-free bran (H_2O 11.1%) with hot 95% EtOH and cold, hot, and superheated H_2O in succession were mainly starch (superheated and sol. in hot H_2O 8.96 and 1.79%, resp.), the residue containing chiefly pentosan (7.82% probably araban). Similarly from fat-free germ (H_2O 16.12%) were obtained chiefly sucrose (sol. in hot EtOH 14.35%) and a small amount of starch (3.29%).

187I. Chemical composition of rice. II. Composition of husk.

KIHARA, Y. *J. Agr. Chem. Soc. Japan, 19,* 577-8 (1949); *Chem. Abst., 43,* 1117^f (1949).

The husk as analyzed by the Shikata-Fukuwatari method contains H_2O 3.74, ash 17.03, N 0.97, crude protein 6.06, total sol. carbohydrates 27.25, pentosan (hydrolyzed to xylan) 16.94, EtOH. C_6H_6 ext. 1.33, cold H_2O ext. 7.53, hot H_2O ext. 20.88, (fat-free sample) total cellulose 35.48, and α-cellulose 26.73%.

188I. Composition of rice bran oil.

MURTI, K. S. *Rice J., 52,* 14-16, Jan., 1949.

The characteristics and composition of two crude and one refined rice bran oil have been determined. These oils were obtained by solvent extraction of commercial rice brans from Texas-grown Blue Bonnet and Arkansas-grown Zenith varieties of rice. The glyceride composition of the two crude and one refined oil was found to be: 0.80, 1.06, and 0.84% linolenic acid; 33.2, 30.6, and 33.1% linoleic acid; 45.0, and 46.3% oleic acid; 17.1, 17.3, and 17.1% saturated acids; and 3.9, 5.0, and 2.7% unsaponifiable matter, respectively.

FROZEN FOOD

189I. Proper defrosting methods keep bacterial counts low in frozen egg products.

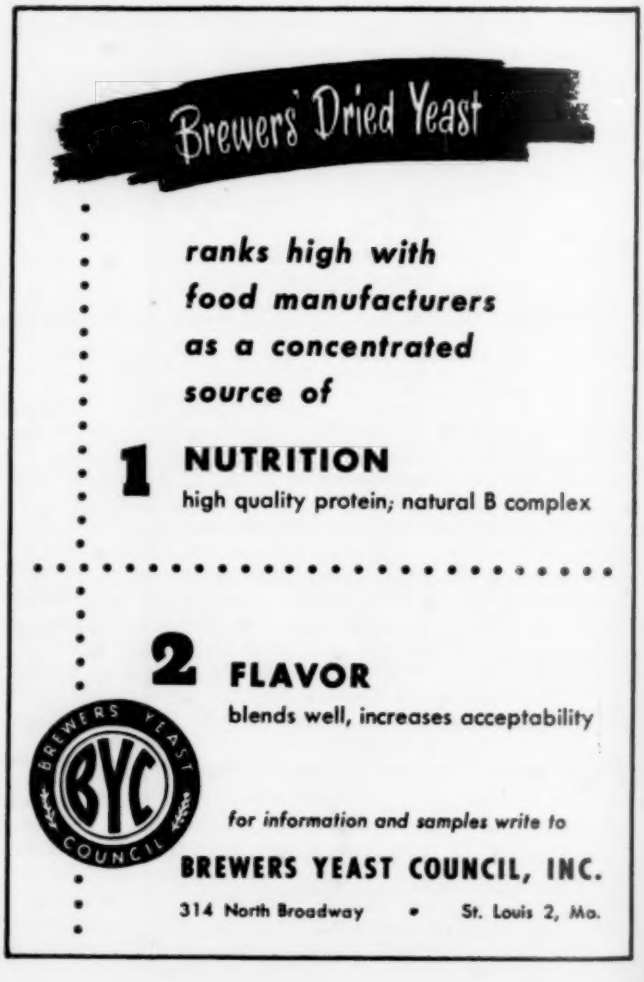
WINTER, A. R., AND WRINKLE, C. *Egg and Poultry, 55,* 28-31, Mar. 1949.

Optimum methods and temp. for defrosting egg products are given. Bacteria increased in nearly all the cans during the first 24 hours of the defrosting period. They increased fastest in yolk, slowest in white. Bacterial increase was less marked in cans defrosted in 58° running water than in cans held at a room temperature of 68°. Frozen egg held at 55° for as long as 48 hours showed no detrimental increase in bacterial content. Differences in the bacterial flora in different lots of eggs probably account for wide variations in the rate of bacterial increase during the defrosting period.

190I. Freezer burning prevented by water.

HENDERSON, E. W. *Quart. Bull. Michigan Agric. Exp. Sta., 24,* 304 (1942); *Pack. Abst., 5,* 525, No. 1964 (1948).

(Turn to page 15, following technical papers)



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News of the Institute

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INSTITUTE OF FOOD TECHNOLOGISTS

JULY 9-14, 1949

San Francisco

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SATURDAY, JULY 9, 1949

9:30-12:00, 2-5 P.M. Council Meeting. Palace Hotel.

12:15 Council Luncheon.

SUNDAY, JULY 10, 1949

10:00-12:00 Section Officers Breakfast. Palace Hotel.
Chairman: J. L. Heid, Florida Citrus Canners Coop., Lake Wales, Florida.

11:00- 1:00 Committee on Chemicals in Foods. Palace Hotel.
Chairman: M. A. Joslyn, University of California.

SUNDAY AFTERNOON, JULY 10, 1949

12:30- 3:30 Editorial Committee Luncheon. Palace Hotel.
Chairman: C. Olin Ball, Editor.

1:30- 3:30 Pectin Standardization Seminar. Palace Hotel.
Presiding: E. E. Meschter, American Preserve Co., Philadelphia, Pa.

SUNDAY EVENING, JULY 10, 1949

5:00-10:00 Registration. Whitcomb Hotel. (Mezzanine Floor).

7:30- 9:30 Wine Program. Whitcomb Hotel. (Crystal Room).
Chairman: Harry Baccigaluppi, President, Wine Institute.
Introductory Remarks—Harry Baccigaluppi.
Wine Growing in America—Movie in Color.
Grape Varieties—A. J. Winkler, University of California.
Wine Types—M. A. Amerine, University of California.
Flor Sherry—W. V. Cruess, University of California.
Technological Problems—M. A. Joslyn, University of California.
Medical Aspects of the Use of Wines—Salvatore P. Lucia, M.D., University of California Medical School.
Wine Cookery—Genevieve Callahan, Food Consultant, San Francisco.

9:30-11:00 Reception and Presentation of California Wines. (All participating). Whitcomb Hotel, Crystal Room.

MONDAY MORNING, JULY 11, 1949

8:30-12:00 Registration. Civic Auditorium Foyer.

9:00-12:00 Exhibits. Civic Auditorium Exposition Hall.

9:00-11:00 General Session, Polk Hall, Civic Auditorium.
Chairman: Samuel C. Prescott, Dean Emeritus, M. I. T.

9:00 Introductory Remarks. W. R. Junk, Chairman, No. Calif. Section and Convention.
The Food Technologist and the World Food Crisis.
Mogens Jul, Chief Technologist, Fisheries Division, Food and Agriculture Organization of the United Nations.
Stabilization of Farm Prices.
Harry R. Wellman, Director of the Giannini Foundation, University of California, Berkeley.
Food Industry Cooperation with the Armed Forces.
Rohland Isker, Colonel U. S. A. Retired, Secretary, Associates, Food and Container Institute.

11:00-12:00 Food Industries Award. Polk Hall, Civic Auditorium.
Introduction—Frank K. Lawler, Editor, Food Industries.
Presentation—W. V. Cruess, University of California.
Acceptance—By recipient.

12:15 Stephen M. Babcock Award Luncheon, Whitcomb Hotel.
Presentation of Award—President, H. C. Diehl.
Acceptance of Award—Recipient.

MONDAY AFTERNOON, JULY 11, 1949

1:00- 6:00 Exhibits—Exposition Hall.

2:00- 5:00 Concurrent Sessions A, B, C and D. Civic Auditorium.

SESSION A

Polk Hall

Operation and Production

Chairman: Lloyd A. Hall
Griffith Laboratories, Chicago

Government Meat Inspection in Canada.
Gordon Rose, Associate Chief Veterinarian, Department of Agriculture, Ottawa, Ontario.

Use of Pilot Plants in the Food Industry.
Guy Fox, Vice-President, Refinery Division, Armour & Company, Chicago, Illinois.

Some Advances in the Production of Edible Oils and Fats.
Harold Mitchell, Director of Laboratories, Swift & Company, Chicago, Illinois.

Technological Advances in Meat Preservation.
F. W. Griffith, Secretary-Treasurer, The Griffith Laboratories, Inc., Newark, New Jersey.

Solvent Extraction for the Food Industries.
F. Lerman, Kennedy Extraction Division, The Vulcan Copper & Supply Co., Cincinnati, Ohio.

The Independent Scientific Laboratories Serve the Food Industries.
Roger W. Truesdail, President, Truesdail Laboratories, Los Angeles, California.

Food Products Liability.
Sidney A. Moss, Attorney, Los Angeles, California.

SESSION B

Larkin Hall, Civic Auditorium

Symposium—Chemical Treatment of Raw Materials

Chairman: RAY B. WAKEFIELD
Gerbers Products Company, Fremont, Michigan

The Potential Health Hazards Involved with Materials of Unknown or Incompletely Known Toxicity.
James R. Wilson, M.D., Secretary, Council on Foods and Nutrition, American Medical Association, Chicago, Illinois.

Application of the Federal Food, Drug and Cosmetic Act to Food Raw Materials Bearing Chemical Residues.
McKay McKinnon, Jr., Chief, San Francisco District, Food and Drug Administration, San Francisco.

Actual Residues in Foods Resulting from Various Insect Control Programs.
W. M. Hoskins, Entomology Division, University of California, Berkeley, California.

SESSION C

Room 401, Civic Auditorium

Investigations—General

Chairman: WILLIAM GEDDES
University of Minnesota

Antioxidants in Hemoglobin, Catalyzed Oxidations of Unsaturated Fat.
Irene Chang and Betty M. Watts, Syracuse University.

A Micro Method of Detecting the Enzymatic Breakdown of Cephalins; Estimation of Free Ethanolamine.
W. Gordon Rose, Western Regional Research Laboratory.

Experimental Baking in the Wheat Protein Research Program of the Western Regional Research Laboratory.
Angeline H. Elder, J. W. Pence and D. K. Mecham, Western Regional Research Laboratory.

Storage Studies on Active Dried Bakers' Yeast.
Roy E. Morse, University of Georgia and C. R. Fellers, University of Massachusetts.

The Sizing of Ion Exchange Equipment for Food Industries.
N. K. Heister, Stanford Research Inst., Palo Alto, California.

Packaging Whipped Cream in Pressurized Containers.
W. Earl Graham, Crown Can Company, Philadelphia.

Browning and the Fluorescence of Evaporated Milk.
N. P. Tarassuk and H. D. Simonson, University of California, Davis.

SESSION D

Room 402, Civic Auditorium

Investigations—Miscellaneous Products

Chairman: AGNES FAY MORGAN
University of California

The Jelly Grading of Pectin.
Mamie Olliver, Chivers & Sons, Ltd., Cambridge, England.

Pectinate Coating.
H. S. Owens, H. A. Swenson, J. C. Miers, and E. Lowe, Western Regional Research Laboratory.

The Lactic Acid Content of California Wines.
Maynard Amerine, University of California, Davis.

The Bulk Fermentation of Spanish-Type Green Olives.
R. N. Ball, Ed Van Dellen and J. B. Jaquith, Pacific Olive Co., Visalia, Calif., and Reese Vaughn, Joseph Tabachnick and G. T. Wedding, University of California, Berkeley.

Irish Moss Extractives.
Leonard S. Stoloff, Krim-Ko Corporation, New Bedford, Massachusetts.

Hygroscopicity of Sugar and Other Factors Affecting Retention of Quality.
Theodore J. Nelson, California and Hawaiian Sugar Refining Corporation, Ltd., Crockett, California.

MONDAY EVENING, JULY 11, 1949

6:00–11:00 Exhibits—Exposition Hall.

7:30–10:30 CONCURRENT DISCUSSION GROUPS. Polk Hall, Civic Auditorium.

A. Advanced Food Plant Engineering. Polk Hall.
Chairman—Frank K. Lawler, Editor, Food Industries.

B. Brewers Yeast. Room 403, Civic Auditorium.
Chairman—Elsie Singruen, Secretary, Brewers Yeast Council, Chicago.

C. Citrus Products. Room 401, Civic Auditorium.
Chairman—J. L. Heid, Florida Citrus Canners Cooperative, Lake Wales, Florida.

D. Education. Room 111, Civic Auditorium.
Chairman—E. M. Litwiller, Oregon State College, Corvallis, Oregon.

E. Fish and Fish Products. Room 108, Civic Auditorium.
Chairman—H. L. A. Tarr, Pacific Fisheries Experimental Station, Vancouver, B. C.

F. Pickles and Pickled Products. Room 404, Civic Auditorium.
Chairman—J. L. Etchells, U. S. D. A., Raleigh, North Carolina.

G. Plant Sanitation. Larkin Hall.
Chairman—M. E. Parker, Illinois Institute of Technology, Chicago.

H. Preservation with Gases. Room 402, Civic Auditorium.
Chairman—H. J. Phaff, University of California, Berkeley.

I. Processing Potatoes. Room 105, Civic Auditorium.
Chairman—O. P. Pierson, Caribou, Maine.

TUESDAY MORNING, JULY 12, 1949

8:30–12:00 Registration, at Civic Auditorium Foyer.

9:00–12:00 Exhibits, Exposition Hall.

9:00–11:30 CONCURRENT SESSIONS A, B, C AND D. Civic Auditorium.

SESSION A

Polk Hall

Operation and Production

Chairman: ROGER TRUESDAIL
Truesdail Laboratories, Los Angeles

Chlorination Applied to the Food Industry.
Wm. J. Scarlett, Wallace & Tiernan Co., Inc., Newark, New Jersey.

Your Salt by Modern Manufacturing Methods.
Paul Imes, Chief Chemist, Carey Salt Co., Hutchinson, Kansas.

Industrial and Production Trends in the Baking Industry.
Wm. H. Cathcart, Director of Laboratories, The Great Atlantic & Pacific Tea Co., National Bakery Division, New York, New York.

Electro-Sensing . . . An Advanced Measuring Tool for Food Process Control.
Lloyd E. Slater, Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Philadelphia, Pa.

Research Problems in the Field of Dairy Industry.
Paul F. Sharp, Director, University of California, Agricultural Experiment Station, University of California, Berkeley, California.

Fishery By-Products in Washington and Oregon.
F. Bruce Sanford, Chemist, Fishery Technological Laboratory, U. S. Department of the Interior, Fish and Wildlife Service.

SESSION B

Room 401, Civic Auditorium

Investigations—Fruits

Chairman: M. A. Joslyn
University of California

Problems Underlying the Behavior of Citrus and Avocado Fruits in Storage.
J. B. Biale, University of California, Los Angeles.

Ascorbic, Citric and Dihydroxymaleic Acids as Antioxidants in Frozen Pack Fruits.
C. C. Strachan and A. W. Moyls, Dept. of Agriculture, Summerland, B. C.

Sugars of Citrus Juices.
R. M. McCready, E. D. Walter and W. D. Maclay, Western Regional Research Laboratory.

Certain Inaccuracies in the Determination of Coliforms in Frozen Orange Juice.
J. Martinez and M. D. Appleman, University of Southern California.

Bacteriological Studies on Commercially Prepared Orange Juice Stored at —10° F.
E. R. Wolfrod, Western Regional Research Laboratory.

Laboratory Studies on Factors Affecting Leaching Losses During Processing of Apples.
Ann M. Mylne and C. G. Seegmiller, Western Regional Research Laboratory.

Syrup Treatment of Apple Slices for Freezing Preservation.
D. G. Guadagni, Western Regional Research Laboratory.

SESSION C

Room 402, Civic Auditorium

Investigations—Fish, Meat and Poultry Products

Chairman: George F. Stewart
Iowa State College

Further Studies in the Process of Freezing Eggs in the Shell.
Socrates A. Kaloyereas, Louisiana State University.

Some Effects of the Shell Treatment of Eggs with Oil.
J. R. Vickery, Division of Food Preservation, Homebush, N. S. W., Australia.

Post-Mortem Changes in Stored Meat. I. Microorganisms Associated with Development of Slime on Eviscerated, Cut-up Poultry.
John C. Ayres, Winston Ogilvy and George F. Stewart, Iowa State College.

The Freezing Preservation of Turkey Meat Steaks.
A. A. Klose and H. L. Hanson, Western Regional Research Laboratory.

Palatability of Beef Stored at 0° F. as Affected by Moisture Loss and Oxygen Availability.
M. P. Steinberg, J. D. Winter and Andrew Hustrulid, University of Minnesota.

Methods of Determining the Incidence of Putrefactive Anaerobic Spores in Meat Products.
Martin V. Burke, K. H. Steinkraus and John C. Ayres, Iowa State College.

A Comparison of Chemical Changes in Mackerel Tissues Treated by Ionizing Radiation.
John T. R. Nickerson, Samuel A. Goldblith and Bernard E. Proctor, Massachusetts Institute of Technology.

SESSION D

Room 403, Civic Auditorium

Investigations—Freezing and Processing

Chairman: R. Legault
Western Regional Research Laboratory, Albany, Calif.

Activity of Wetting Agents—Temperature Effects.
F. H. Lucas and A. H. Brown, Western Regional Research Laboratory.

Newer Blanching Principles.
Margaret Ives, American Can Company, Maywood, Illinois.

Observation of Color Changes in Some Processed and Stored Foods.
E. J. Eastmond, Western Regional Research Laboratory.

Techniques and Procedures for Testing Commercial Air-Blast Freezers.
O. H. Spaugh, G. S. Smith and E. Lowe, Western Regional Research Laboratory.

Fundamentals of Concentrating Liquids by Freezing.
Rudolf Heiss, Institut für Lebensmitteltechnologie, Munich, Germany.

A Defrosting Indicator for Frozen Foods.
A. A. Anderson, Western Regional Research Laboratory.

Recent Developments in Food Freezing.
R. W. Kilburn, Food Machinery and Chemical Corp., San Jose, California.

TUESDAY AFTERNOON

12:00 noon Annual I. F. T. Business meeting. Luncheon, Hotel Whitcomb.
President, H. C. Diehl—presiding.

1:15– 3:45 General Session. Polk Hall, Civic Auditorium.
Symposium—Long Distance Transportation of Perishable Foods.

Chairman: B. E. Proctor
Massachusetts Institute of Technology, Cambridge, Mass.

Transportation of Fresh Fruits and Vegetables in Refrigerated Freight Cars.
John N. Kelley, Manager, Fruit Transportation, Fruit Dispatch Company, New York, New York.

Performance Tests in Refrigerator Cars.
W. T. Pentzer, Senior Physiologist, U. S. D. A. Horticultural Field Station, Fresno, California.

Marine Transportation of Perishables.
William Keller, United Fruit Co., New York, New York.

Recent Advances in the Air Transportation of Perishable Foods.
J. Prescott Blount, California Aeronautical Commission, Sacramento, California.

Reduction of Post Harvest Spoilage in Fresh Fruits and Vegetables Destined for Long Distance Shipment.
Dean E. Pryor, Phytopathological Research, Wallace & Tiernan Sales Corp., Monrovia, California.

4:15– 6:00 Inspection of modern transportation facilities for perishable toods. (Details to be announced at symposium).

(Turn to page 9, following technical papers)

Book Review

THE CHEMISTRY AND TECHNOLOGY OF ENZYMES, by Henry Tauber. John Wiley & Sons, Inc., New York, 1949, 550 pages. Price $7.50.

The present volume is apparently an outgrowth of two earlier books by the author, "Enzyme Chemistry," a general book, and "Enzyme Technology," which deals with industrial applications.

Part I, which is devoted to the more fundamental side of the field, is vastly superior to its predecessor in scope and quality of treatment; however, it is somewhat limited in comprehensiveness. This is probably due in part to intention and space limitation, but there is some tendency of the author to dwell at length on rather minor points at the expense of larger considerations. The enzymes are treated in what might be called a traditional manner by being grouped chapter-wise, largely by function, but unfortunately there are no good integrating discussions of the arginase cycle or tricarboxylic acid cycle, and in fact, intermediary metabolism is only occasionally noticed at all.

This seems like a good place for the reviewer to make a plea for an extension of the chapter "General Considerations" in books of this type. Tauber's chapter, but 25 pages long, treats with tantalizing brevity of definitions, classifications, activation energy, pH activity curves, mode of action, kinetics, essential groups, etc., and is good by ordinary standards. Actually, this chapter is the most important single chapter in any book of this sort, and it is here that the more fundamental concepts of the science of enzymology should be rather thoroughly expounded.

Part II, dealing with the practical application of enzymes is, on the other hand, unique in its field. It has been improved and revised and represents virtually the only work of its type available. Fortunately the application of enzymology to the food and pharmaceutical industries, as well as the enzymatic aspects of industrial fermentations for production of ethanol and other commercially important compounds are well treated herein. Other miscellaneous applications are considered along with the microbiological assay of amino acids and vitamins. All in all there is very little in the domain of enzyme technology that is not touched.

There seems to be quite a number of errors, largely typographical, particularly in Part I. Since most of the errors are obvious, they are not apt to be serious and there is no point in enumerating them here in detail. By way of example, on page 94 the equation for the phosphorolysis shows an internal rather than a terminal glucose unit involved, and on page 232 the structural formula for fumaric acid is carelessly set up. One of the chief values of this work is as a reference; the few errors and omissions which have been noted in the indices should not impair its function in this respect.

This book is certainly to be recommended to the food technologist, for not only can it provide him with a knowledge of the practical role of enzymes, but it can give him, in rather simple terms, a basic knowledge of a subject about which he most likely wishes he knew a great deal more than he does.

BERNARD AXELROD.

FOOD INDUSTRIES, CHEMISTRY AND PROCESSING, by Jacob Fiegenbaum. Rubin Mass, Publisher, Jerusalem P. O. B. 990, 1947, 496 pages plus several unnumbered pages of Appendix.

Describes production of principal food products of Palestine and their existing specifications and standards. Among the products discussed are dairy products, bakery products, canned fruits and vegetables, edible oils, meat and fish products, jams, preserves and jellies, essential oils, confectionery and chocolate. There are no photographs or other illustrations. The space devoted to each product is rather brief, nevertheless, the book gives the reader a clear understanding of the methods of food processing and preservation in use in Palestine.

The book should prove very useful in Palestine and other countries of the Near East for use in classes in food technology, and as a reference book in food laboratories. Also American food technologists may find in it valuable suggestions that may apply to food processing in the United States. Those personally interested in Palestine will find it particularly useful. It is written in a rather non-technical manner, hence is readly comprehended by those untrained in food technology.

W. V. CRUESS.

News of the Institute

NINTH ANNUAL CONVENTION PROGRAM

(Continued from page 8, preceding Editorial)

TUESDAY EVENING

7:30– 9:30 Banquet, Fairmont Hotel.

President, H. C. Diehl, presiding.

Nicholas Appert Award.

Presentation—Charles Smith, Chairman, Chicago Section of I. F. T.

Acceptance and address by Nicholas Appert Medalist, Roy C. Newton, Vice-President, Swift & Co., Chicago, Ill.

WEDNESDAY MORNING, JULY 13, 1949

8:30–12:00 Registration in Auditorium.

9:00–12:00 Exhibits—Exposition Hall.

9:00–12:00 CONCURRENT SESSIONS A, B, C AND D. Civic Auditorium.

SESSION A

Polk Hall

Operation and Production

Chairman: JOHN M. JACKSON

Research Division, American Can Co., Maywood, Illinois

Controlling Seasonal Pack Costs.
Douglas Watson, Management Consultant, McKinsey & Company, San Francisco, California.

Some Reciprocal Actions Affecting Foods and Containers Due to Freezing.
W. J. Finnegan, Consulting Engineer, W. J. Finnegan Company, Los Angeles, California.

Some Fundamental Considerations in the Processing of Frozen Orange Juice Concentrate.
C. W. Kaufman and H. A. Campbell, Research and Development Department, General Foods Corporation, New York.

Quality and Nutritive Value of Peas as Affected by Blanching.
D. G. Heberlein, Louis Ptak, Sidney Medoff and L. E. Clifcorn, Research Department, Continental Can Co., Chicago, Illinois.

Pineapple Fruit Quality Control.
F. P. Mehrlich, Ass't. Vice-President, Director of Research, and Richard B. Morse, Hawaiian Pineapple Co., Honolulu 1, T. H.

Influence of Packing Conditions on the Process Requirements of Vacuum Packed Whole Kernel Corn.
W. H. Wade, D. V. Alstrand, H. A. Benjamin and J. M. Jackson, General Research Laboratory, American Can Co., Maywood, Illinois.

Influence of Storage Conditions on Ascorbic Acid Content and Quality of Canned Orange Juice.
J. F. Feaster, O. G. Braun, D. W. Riester, and P. E. Alexander, American Can Company, Maywood, Illinois.

SESSION B

Larkin Hall, Civic Auditorium

Investigations—Objective and Subjective Evaluations

Chairman: HELEN L. HANSON
Western Regional Research Laboratory, Albany, California

Flavor Profiles—A New Approach to Flavor Problems.
S. E. Cairncross and L. B. Sjöström, Arthur D. Little, Inc., Cambridge, Massachusetts.

Improving the Reliability of Analytical Organoleptic Tests.
Frances Carlin, Iowa State College.

Studies on Human Appetite.
Franz R. Goetzl, M.D., The Permanente Foundation, Oakland, California.

Quantitative Determination of Flavor and Odor of Frozen Fruits and Vegetables.
John B. Wegener, Carl M. Hill, Ruby M. Prigmore, Mary E. Hill, Tennessee Valley Authority and Tennessee Agricultural and Industrial State College, Knoxville.

New Synthetics for Flavors.
Abraham Seldner, F. Ritter & Company, Los Angeles, California.

Objective Evaluation of Odor Deterioration in Orange Oil.
B. E. Proctor and E. M. Kenyon, Massachusetts Institute of Technology.

Development of Objective Methods for Determining Quality Factors, with Special Reference to Raw and Canned Corn.
Amihud Kramer, University of Maryland.

SESSION C

Room 401, Civic Auditorium

Investigations—Vegetables

Chairman: ARTHUR N. PRATER
Gentry, Inc., Los Angeles

Vitamin Retention in Raw, Cooked, Dehydrated and Canned Dry Beans.
Lowell E. Kidder, Marian Hunner, Betty C. Carl, and Agnes Fay Morgan, University of California, Berkeley.

Observations on the Oxidase of Asparagus.
W. V. Cruess and James Sugihara, University of California, Berkeley.

Acetaldehyde and Related Carbonyl Compounds in Frozen Peas.
Jean David, Department of Agriculture, Montreal, Quebec, Canada.

Effect of Storage Temperature on Quality of Frozen Peas.
F. E. Lindquist, W. C. Dietrich and Mildred M. Boggs, Western Regional Research Laboratory.

The Role of Bruising in the Development of "Delay" Off-flavor in Peas.
Rachel Uhvits and Alice Collings, Western Regional Research Laboratory.

Value of Starch Coating in the Preservation of Quality of Dehydrated Carrots.
M. P. Masure, G. S. Bohart, E. J. Eastmond and Mildred M. Boggs, Western Regional Research Laboratory.

Effect of Irrigation on the Yield and Quality of Vegetable Crops.
John B. MacGillivray, University of California, Davis.

SESSION D

Room 402, Civic Auditorium

Investigations—General

Chairman: WALTER RICHERT
Wines and Vines Magazine, San Francisco

Canning and Pasteurization of California Dates.
B. W. Nielsen, R. J. McColloch, and E. A. Beavens, Bureau of Agricultural and Industrial Chemistry, U. S. D. A., Los Angeles.

Use of Epoxides in the Preservation of Foods.
H. J. Phaff, E. M. Mrak, University of California, Berkeley, and C. D. Fisher, Coast Laboratories, Fresno.

Effect of Gases on Shelf Life of Food Products.
A. L. Bayes, The Linde Air Products Company, Tonawanda, New York.

Mushroom Mycelium Production by Submerged Fermentation.
Harry Humfeld, Western Regional Research Laboratory.

A Continuous System of Yeast Production.
W. O. Gord and H. J. Janssen, Southern Regional Research Laboratory, New Orleans, Louisiana.

Peroxidase Activity of Apple Tissue.
R. R. Reddi, W. B. Esselen, Jr., C. R. Fellers, University of Massachusetts, Amherst, Massachusetts.

Film Yeasts on Cucumber Brines.
John L. Etchells and Thomas C. Bell, Bureau of Agricultural and Industrial Chemistry, U. S. D. A., Raleigh, North Carolina.

WEDNESDAY AFTERNOON AND EVENING, JULY 13, 1949

1:00–11:30 VACATION FOR A DAY.

1:00 Buses leave Auditorium for Adobe Creek Inn, Los Altos, California.

2:30 Outing at the Adobe Creek Inn.

Sheriff's Mounted Posse Show (Santa Clara County, California).

Outdoor Barbecue—Hosts—International Minerals and Chemicals Corp.

Dancing.

Swimming.

Sun Bathing.

Hiking.

10:00 Buses leave for San Francisco.

THURSDAY MORNING, JULY 14, 1949

9:00–12:00 Exhibits—Exposition Hall.

9:00–12:00 Concurrent Sessions A, B, C and D. Civic Auditorium.

SESSION A

Polk Hall

Operation and Production

Chairman: Ben F. Buchanan
Director Technical Service, Amino Products Division, International Minerals and Chemicals Corporation.

Aspects of Modern Onion and Garlic Dehydration.
Robert M. Stephenson, Chief Chemist, Basic Vegetable Products, Inc., Vacaville, California.

Properties and Usefulness of Hydrolyzed Vegetable Proteins.
Lewis J. Minor, Stephen L. Galvin and Andrew J. Patton, Huron Milling Co., Harbor Beach, Michigan.

The Occurrence of Free Glutamic Acid in Various Foods.
Lucile R. Hac, M. Louisa Long and M. J. Blish, International Minerals and Chemical Corp., Amino Acid Division, Rossford, Ohio.

Essential Oils, Source, Production and Increasing Importance in Food Industries.
Arthur Downey, Asst. Vice-President, Director of Research and Technology, Magnus, Mabee & Reynard, Inc., New York.

From Wild Orchid to the Finest Vanilla Extract.
Alexander Katz, F. Ritter & Co., Los Angeles, California.

Citrus Oils and their Methods of Extractions.
Ernest Guenther, Vice-President and Chief Chemist, Fritzsche Brothers, Inc., New York.

SESSION B

Larkin Hall, Civic Auditorium

Investigations—Nutrition and Public Health

Chairman: Franz Goetzl, Ph.D., M.D.
Permanente Foundation, Oakland

Importance of Diet in Chronic Toxicity Studies.
Robert H. Wilson and Floyd DeEds, Western Regional Research Laboratory.

Significance of Chronic Toxicity Studies.
Floyd DeEds, Western Regional Research Laboratory.

Toxicity of Thioacetamide in Rats.
Anthony M. Ambrose and Floyd DeEds, Western Regional Research Laboratory, and Leland J. Rather, Stanford University School of Medicine.

Experiments with Delayed Supplementation of Vitamins.
Ernest Geiger, J. Chersky, and E. B. Hagerty, University of Southern California.

Studies on Optimum Fat Requirements.
H. J. Deuel, S. M. Greenberg, C. E. Calbert, E. Savage and T. Fukui, University of Southern California.

The Retention of Vitamins in Sulfited Dehydrated Vegetables.
Agnes Fay Morgan, Betty C. Carl, L. E. Kidder, Lois E. Witham and Marian Hunner, University of California, Berkeley.

Nutritional Value of Fish Proteins and Amino Acids.
M. S. Dunn, University of California at Los Angeles.

SESSION C

Room 401, Civic Auditorium

Investigations—Fruits

Chairman: Ferd. Mehrlich
Hawaiian Pineapple Co., Ltd., Honolulu, T. H.

The Enzymatic Oxidation of Phenolic Compounds in Frozen Peaches.
D. G. Guadagni, D. G. Sorber and Jean S. Wilbur, Western Regional Research Laboratory.

Effect of Temperature and Exposure on the Peeling of Fruits and Vegetables.
John L. Boyen, Atlas-Pacific Engineering Co., Inc., Emeryville, California.

Comparative Value of Certain Carbonyl Enediols in Retarding Enzymic Browning of Fruits.
H. L. A. Tarr and N. E. Cooke, Fisheries Research Board, Vancouver, B. C.

Studies on the Texture of Frozen Apricot Skins.
Leonora Hohl Strohmaier, University of California, Berkeley.

Effect of Storage Temperature on Brined Cherries.
Edward Ross, State College of Washington.

High- and Low-Pressure Bulk Storage of Apple Juice.
Hans M. Freund, Frenot, Ltd., London, England.

Prevention of Discolouration in the Milling of Apples for Natural Apple Juice.
F. E. Atkinson and C. C. Strachan, Dept. of Agriculture, Summerland, B. C.

SESSION D

Room 402, Civic Auditorium

General

Chairman: Edwin L. Mitchell
Richmond-Chase Company, San Jose, California

Some Phases of the Application of Food Technology to Standardized Labelling of Canned Fruits and Vegetables.
J. R. Esty, National Canners Association, San Francisco, California.

Factors Influencing Pressure Variations Within Hermetically Sealed Glass Containers.
John M. Sharf, Armstrong Cork Company, Lancaster, Pennsylvania.

"Sequestrene"—A New Agent for Clarifying Wine.
Jack Krum, University of Massachusetts, Amherst, Massachusetts.

Packaging Sugar in Paper Bags.
W. W. McGimpsey, California and Hawaiian Sugar Refining Corp., Crockett, California.

Introduce Your Engineer to a Food Technologist.
Edward A. Smith, Associated Date Growers and Packers, Indio, California.

Planning to Meet Requirements of Food Processors for Waste Disposal.
W. J. O'Connell and Keith A. Fitch, W. J. O'Connell and Associates, San Francisco, California.

Why Food Industry Sanitarians Must Perforce Train Pest Control Operators.
Donald H. Little, Dried Fruit Association of Calfiornia, San Francisco, California.

THURSDAY AFTERNOON, JULY 14, 1949

1:00–6:00 Local Trips.

Point of departure Civic Auditorium.

A poll of those planning to go on various trips will be taken at the time of registration. Tickets will be available for distribution at time of registration. To be set at least 3 days in advance.

Leave 1:30 p.m. and return about 5:00 p.m. Approximate transportation cost $1.25, for trips A, B and C.

Trip A. Western Regional Research Laboratory and The University of California Campus, including the Cyclotron.

Trip B. Gerber Products Company, Oakland, California. Stokely Foods Inc., Oakland, California.

Trip C. San Francisco Navy Shipyards. (Inspect Battleship Iowa, Cruisers Shangri-La and Hornet, other cruisers, destroyers and submarine Dentuda; Bikini tarket vessel Independence. Description of Bikini A-bomb test.)

Trip D. C and H Sugar Refinery, Crockett, California. (Transportation furnished.)

2:30–5:00 FROZEN FOODS TECHNICAL COMMITTEE MEETING. At the Western Regional Research Laboratory, U. S. D. A., Albany, California. E. H. Wiegand, Chairman.

6:30–9:30 TRIP. Rainier Brewing Company, San Francisco. Limited to 60 persons.

FRIDAY, JULY 15, 1949

Point of Departure, Civil Auditorium.

A poll of those planning to go on various trips will be taken at time of registration. Tickets will be available for distribution at time of registration. To be set at least 3 days in advance.

All-day trips. Leave 8:30 a.m. and return about 5 p.m. Approximate transportation cost $2.50 each (except Trip C).

Trip A. Napa Valley Wineries. Inglenook Winery, Napa Valley Cooperative, Beringer Bros., or Beaulieu Vineyards. Beringer Bros., L. M. Martini.

Trip B. Santa Clara Valley. Inspection of International Mineral and Chemical Co., plant at San Jose, California. A Large Fruit Cannery. Stop at Stanford University Campus on return trip.

Trip C. Basic Vegetable Products Co., Vacaville, California. (No expense).

WOMEN'S PROGRAM

A program has been arranged for the fullest enjoyment of the ladies who do not wish to attend technical sessions.

Regional Section News

CHICAGO SECTION

On April 18, the Chicago Section heard a talk by Albert I. Kegan on "Patents and the Food Technologist." Mr. Kegan is to teach a course next fall entitled "Food Regulation and Compliance" in the evening division of the new Department of Food Technology at Illinois Institute of Technology.

Mr. C. G. Barton, of Caspers Tin Plate Co., has been appointed Transportation Chairman for the Chicago Section in arranging transportation to the San Francisco meeting of the Institute.

Mr. R. F. Cohee, of the Corn Products Sale Co., has been appointed the Section's representative on the I. F. T. Employment Committee.

The Chicago Section has decided to publish a special Convention Issue of "The Vitalizer" in June, to be distributed to all members at the Convention in San Francisco.

Dr. H. E. Robinson, Assistant Director of Research, Swift & Company, was interviewed on March 12 and Dr. R. W. Pilcher, Associate Director of Research, American Can Co., was interviewed on March 19 on the "Headlines in Chemistry" radio program on Station WEDC. The broadcasts were the first two in a series of weekly programs sponsored by the Chicago Section of the American Chemical Society.

Dr. J. M. Jackson, of the Research Division, American Can Co., gave a talk on March 2 on "Heat Sterilization in the Package" to graduate students taking a course on food packaging materials and methods, given by the Illinois Institute of Technology.

Mr. E. V. Cassady, of the Packaging Group Research Division, American Can Co., discussed "Flat Sour Spoilage in Tomato Juice" at the Second Vegetable and Fruit Processors' School, Ohio State University, Columbus, on March 16. He also presided over a forum on "Preparation and Packing of Juices and Fruit Nectars."

Mr. G. H. McDonnell, of the Sales Engineering Division, American Can Co., presented a paper (joint with Dr. B. S. Clark, Director of Research, American Can Co.) entitled "Retention of Metal Can Quality" before the University of Chicago Research Council on March 24. The meeting was sponsored by the Committee of Research of the American Meat Institute.

C. L. Smith and W. G. Enns, both members of the Research Department, Continental Can Co., participated in the Second Vegetable and Fruit Processors' School at Columbus, Ohio, on March 14. The former discussed "Some Trends in the Modern Canning Industry," and the latter led discussions on "Processing and Cooling Non-Acid Vegetables Packed in Tin" and "Pasteurization Equipment and Methods."

G. H. Bendix, of the Continental Can Co., presented a paper (joint with W. C. Stammer) entitled "Control Methods in the Canned Food Industry" at the San Francisco meeting of the American Chemical Society on March 31. He also presented a paper on "The Determination of Traces of Metals in Beer" before a meeting of the Association of Brewing Chemists in New Orleans, April 13.

Joseph A. Czarnecki, of the Griffith Laboratories, Inc., attended the National Pickle Convention at Michigan State College, East Lansing, Michigan.

Dr. L. A. Hall, of the Griffith Laboratories, Inc., attended a protein conference at Rutgers University, New Brunswick, N. J., the latter part of January. On April 5 at a joint meeting in Toronto, Canada, of the Cereal Chemists, the Agricultural Institute of Canada, and the Chemical Art Gallery, he spoke on "The Use of Spices and Flavors in the Food Industries."

Mr. T. B. Ayres, of the American Can Company, has been transferred to the staff of the Pacific Division

Laboratory as Research Representative at Los Angeles, California.

Dr. O. R. Alexander and Mr. E. R. Blair, of the American Can Company, attended the annual convention of the American Society of Brewing Chemists held in New Orleans April 10 through April 14.

Dr. B. S. Clark, Director of Research of the American Can Company, attended an Advisory Board Meeting of the National Research Council in Washington on April 8.

NORTHERN CALIFORNIA SECTION

The following applications for membership in the Northern California Section were approved at the Executive Committee meeting on March 15:

Chester A. Wood, Wm. J. Stange Co.
James J. Corridan, American Home Foods, Clapp Baby Food Div.
Monte L. Kewley, A. O. Smith Corp.
William W. McGimpsey, C & H Sugar Refining Corp.
Theodore J. Nelson, C & H Sugar Refining Corp.
James E. Carrel, Dewey & Almy Chemical Co.
Robert B. Baylor, California Packing Corp.
Albert J. Klubock, The Sherwood Co. (national member).

A preliminary draft of the proposed by-laws for incorporation of the Northern California Section was submitted to the Section for approval at the April meeting.

Leo A. Berti, formerly with the Coast Laboratories, Fresno, is now an independent consultant on wines and winery problems.

Henry J. Reynolds, of Armour & Co., Chicago, was a visitor in Northern California in the spring.

Dr. George Stewart, Associate Director of the Agricultural Experiment Station, Iowa State College, spent a few days around Berkeley in March.

Dr. L. H. Strohmaier of the University of California attended the U. S. D. A. Bureau of Home Nutrition and Home Economics Conference on Home Food Freezing in Washington, D. C., where she took part in the discussions.

NORTHEAST SECTION

L. M. Richardson, Jr., has been appointed Supervisor of Edible Technical Services in the research department of Lever Brothers Company, with headquarters at Cambridge, Mass. He will be in charge of technical services involving uses of oils and fats in the baking and allied industries. Mr. Richardson joined the Lever organization in July 1948, having been formerly associated with Beatrice Foods Company, Chicago.

A new member of the Food Department of Arthur D. Little, Inc., is Mrs. Emily Rockwood, a graduate pharmacist of Purdue, who worked for four years in the laboratories of Eli Lilly & Company at Indianapolis. She is hereabouts while her husband, Wade, is studying at Harvard Medical School.

L. B. Sjöström of Arthur D. Little, Inc., read a paper on "Odor Detection and Odor Thresholds" (written in cooperation with E. C. Crocker) at the Manufacturing Chemists' Symposium on Atmospheric Contamination at New York, on April 19.

SOUTHERN CALIFORNIA SECTION

On April 20, the Southern California Section held a dinner meeting and subsequently participated in a cooperative program presented by the milling industry. A number of members of the Society of Bakery Engineers were present. The papers and speakers were as follows:

"Wheat Varieties and Characteristics." Mr. Broom, Sperry Division, General Mills.
"Technology of Milling: Wheat Blending; Wheat Conditioning: Milling Operation; Ultimate Blending of Flour Streams." H. S. Gabbert, General Mills.
"Enzyme Control in Flours through Bleaching." H. N. Carter, Globe Division, Pillsbury Mills.

The three speakers were joined subsequently by Mr. T. N. Ovlen, General Mills, and Mr. Thomson, Pillsbury Mills, in a panel to answer questions from the floor.

Mr. Thomas A. Bruce, of the Corn Products Refining Company and a member of the Northern California Section, was a visitor at the April meeting.

The topic of organizing field trips in the Los Angeles area for visitors to and from the Convention was discussed at the April meeting. The idea met with approval, but no definite plans were formulated at that time.

On May 18 the Section heard a talk on "Baby Foods" by Dr. Robert Stewart of the Gerber Products Co.

NEW YORK SECTION

Dr. Axel Olsen, of General Foods Central Laboratories, was presented at the April meeting of the New York Section with a silver medallion in recognition of his service to the Royal Swedish Institute during his visit to Sweden last summer. The presentation was made by Professor Edy Velander, Director of the Royal Swedish Academy of Engineering Sciences, who was the main speaker at the meeting (see May issue of FOOD TECHNOLOGY).

FLORIDA SECTION

On March 24, the Florida Section held a dinner meeting in Tampa, Florida. Dr. B. W. Hammer, formerly head of the Division of Dairy Industry, Iowa State College, gave the address of the evening. Dr. Hammer spoke on "The Development of Bacteriological Sanitation in the Dairy Industry."

On April 8, the Section met at the Citrus Experiment Station, Lake Alfred, Florida. The guest speaker, Dr. Kenneth G. Dykstra, Director of Birdseye-Snider Laboratories, Birdseye-Snider Division of the General Foods Corporation, talked on "Frozen Foods and the Food Technologist."

On April 21, the Section met at Orlando, Florida, where Dr. R. F. Cohee, Jr., from Corn Products Sales Co., Chicago, Illinois, gave a talk on "Sweetners."

WESTERN NEW YORK SECTION

On April 30, members of the Western New York Section met in Rochester, N. Y., for afternoon and

evening sessions. The afternoon program was as follows:

"Grapes of New York State Used in Making Champagne." Dr. James T. Cusick, Pleasant Valley Wine Company, Hammondsport, New York.

"Recent Developments in Milling Technology." Mr. J. George Kerr, Superintendent Russell-Miller Milling Company, Buffalo, N. Y.

"The Tin Can and Its Problems." Mr. F. C. Baselt, Director of Research, American Can Company, Atlantic Division, New York, N. Y.

"The Effects of Processing on the Nutritional Value of Foods." Dr. David B. Hand, Director Department of Food Technology, N. Y. State Agricultural Experiment Station, Geneva, N. Y.

"Relation of Yield and Quality of Processed Peas on Tenderometer Readings of the Raw Product." Dr. James C. Moyer, N. Y. State Agricultural Experiment Station, Geneva, N. Y.

The dinner speaker was Dr. Kenneth G. Dykstra, Director of Birdseye-Snider Laboratories, Albion, New York. The subject of his talk was "Quick Frozen Orange Juice Concentrates."

PHILADELPHIA SECTION

On April 14, the Philadelphia Section held a dinner meeting, after which they were addressed by Dr. J. S. Long, Chemical Director and member of the Board of Directors of Devoe & Raynolds Co., Inc. His topic was "Recent Developments in Protective Coatings."

MARYLAND SECTION

On April 8, the Maryland Section held a dinner meeting in Baltimore, after which Dr. John T. Owen of the Vitamin Division of Merck & Co., Inc., Rahway, N. J., spoke on "Rancidity and Its Prevention in Foods."

MOHAWK VALLEY SECTION

The fifth and final meeting of the season for the Mohawk Valley Section took place on March 28 at Canajoharie, N. Y. Dr. Carl R. Fellers, National Secretary of I. F. T. and head of the Department of Food Technology, University of Massachusetts, spoke informally about the I. F. T. and gave some news of other sections. He likewise presented a paper concerning the place of the laboratory in the food industry. Dr. William Esselen of the University of Massachusetts gave a review of the progress that has been made in glass processing.

IOWA SECTION

On February 23, the Iowa Section of I. F. T. met with the Ames Section of the American Chemical Society to hear a talk by Mr. Ernest C. Crocker, flavor specialist of Arthur D. Little, Inc., Cambridge, Mass. Mr. Crocker gave an instructive talk on "Odors, Flavors, and Taste" and explained how the Crocker-Henderson system of evaluating odors was developed.

On April 8, the Iowa Section met in Ames to hear a talk by Miss Mary Aiken, head of the Microbiological Department of the H. J. Heinz Co., Pittsburgh, Pa. She outlined the work in quality control and improvement for which she is responsible in their Pittsburgh laboratory.

At a business meeting on April 8 a motion was carried unanimously to retain the present fiscal year of the Section in preference to changing over to the calendar fiscal year now being used by the national I. F. T.

Plans were discussed for a meeting in Cedar Rapids on May 6, to visit during the day the Quaker Oats Co., the Cherry-Burrel Co., the Wilson & Co. Packing Plant, and possibly a new plant where a continuous process for making butter is in operation. During the evening speakers from each of the plants visited will describe further the activities in their plants.

During the April 8 meeting, discussion was held on the question of changing the name of the Section from the Iowa Section back to the Ames Section, as originally proposed. The Councilor, Dr. George F. Stewart of Iowa State College, was requested to carry this matter to the national meeting in July for final action.

The following officers have been elected for the year 1948-1949:

Chairman: Michael H. Taras. C. A. Swanson & Sons, Omaha, Nebraska.

Vice-Chairman: E. W. Eickelberg. Fairmont Canning Co., Fairmont, Minnesota.

Secretary: Robert G. Tischer. Food Processing Subsection, Iowa State College.

INSTITUTE COMMITTEE ON EMPLOYMENT

Mr. Keith Fitch, W. J. O'Connell & Associates, 109 Stevenson Street, San Francisco, California, is now chairman of the Committee on Employment of the Institute of Food Technologists. A booth or office will be provided for this committee at the Ninth Annual Convention of the Institute in San Francisco for the convenience of those seeking employees or employment.

CORRECTION

Messrs. Owens, McCready, and Maclay, authors of the paper entitled "Gelation Characteristics of Acid-Precipitated Pectinates," published in FOOD TECHNOLOGY *3*, 77 (1949) request that an error which occurred in that paper be published. In the first column on page 77, credit for a counter-current extractor was given to L. J. Graham and A. D. Shepherd. This credit was intended for R. P. Graham and A. D. Shepherd.

Abstracts

(Continued from page 4, preceding Editorial)

The object was to determine the amount of moisture lost during cold storage for 2*q* months by cuts of poultry subjected to two treatments before freezing for 4½ hrs. at a temperature of —25° F. (—31.67° C.), i.e., glazing by immersion in water and ordinary close wrapping in waxed paper. At the end of the storage period all pieces in both lots (except the giblets) appeared fresh, normal and free from "freezer burn." The glazed samples gained 0.4% in weight and the unglazed samples lost

FRUIT

191I. A quantitative hardness tester for food products.

Ross, E. *Science, 109,* 204 (1949).

The principle of the tester is the determination of that gas pressure necessary to force the blunt end of a piston a very small but fixed distance into the test material. The tester now in use forces a rounded brass tip 5/32" in diameter 1/32" into the pear. The top plate serves both as a stop, restricting penetration to 1/32", and as an electrical contact, completing a circuit which lights an indicator lamp when maximum penetration is reached. Pressures found necessary to effect this penetration into normal green pears have been observed to vary from 50 to 65 pounds per square inch. Abnormally hard pears were found to test above 65. Tips of other sizes and penetrations of different depths may be used for other food products. Any convenient and suitable gas source may be used, such as compressed air or nitrogen.

MILK AND DAIRY PRODUCTS

192I. Frozen homogenized milk. VI. The use of stabilizers in frozen homogenized milk.

Babcock, C. J. et al. *J. Dairy Sci., 32,* 175-82 (1949).

In homogenized milk frozen and stored at —17.8° C., sodium citrate was found to be of value as a stabilizer. Homogenized milk containing added ascorbic acid showed separation when thawed at the same storage age as the control samples, although its addition preserved the flavor slightly longer than did the addition of sodium citrate alone. Hydrogen peroxide and urea each delayed slightly the occurrence of separation in homogenized milk but did not retard the development of abnormal flavors. Pectin and disodium phosphate and calcium chloride and carboxyl methyl cellulose, did not delay separation or retard the development of abnormal flavors. The addition of sodium citrate with ascorbic acid to homogenized milk, frozen and stored at —11.5° C. and at —17.8° C. doubled the time the milk remained normal in appearance and flavor when thawed in comparison with the control samples. The addition of sodium citrate with ascorbic acid also prolonged the time that homogenized milk could be frozen and held at one temperature and subsequently stored at a higher temperature and still be normal in appearance and flavor when thawed.

193I. A comparison of semi-monthly and monthly composite samples as a basis of paying for milk.

Herreid, E. O. *Milk Dealer, 37,* No. 10, 58-64 (1948); *J. Dairy Sci., 32,* A3, No. 14, Jan., 1949.

Data are presented comparing fat test of semi-monthly and monthly composite samples. If preserved composite milk samples are kept in clean, sterile bottles at 50° F., or less, in good physical condition and free from mold growth and are properly prepared, sampled and tested by the Babcock procedure, semi-monthly composites yield slightly more milk fat than monthly composites. However, the difference is so small that testing can be done monthly without material injustice to the patron or to the plant. Semi-monthly and monthly composites can be re-prepared and retested once, after holding for 48 hrs., and the results will be reasonably comparable with those secured from tests made at the end of the sampling period. Significantly lower results are apt to be obtained if composite samples are re-prepared and retested a second or a third time.

PECTIN—JAMS AND JELLIES

194I. Citrus pectin jellies for summer goods — control of sweating.

Gallagher, C. *Conf. J., 75,* 38-9, Mar., 1949.

Sweating of confectionery pectin jellies is the result of a disproportion of the relative percentages of their ingredients, such as an excessive percentage of corn sirup; too high a percentage of water; insufficient amount of pectin; or an excessive amount of invert sugar. Standard ingredients are tabulated to eliminate the first two discrepancies. Incomplete dissolving of the pectin, and degrading of pectin caused by too long a cooking period or too high an alkalinity in the batch, or a combination of the two, are also discussed.

195I. Sunflower pectin.

Stoikoff, St. *Mitt. Gebiete Lebensm. Hyg., 39,* 292-9 (1948); *Chem. Abst., 43,* 1498[r] (1949).

Sunflower tops which were freed from seed were heated with $(CO_2H)_2$ to yield a pectin (about 23% of the air-dried substance) which contains about 87% pure pectin and is characterized by good jellying qualities.

INDUSTRIAL CHEMISTRY

196I. Public opinion polling and industrial sampling.

Brumbaugh, M. A. *Ind. Qual. Control, 5,* 28, Nov., 1948.

Industrial sampling and public opinion polling require two quite diverse operating techniques. These differ so much, in fact, that persons trained in either would have to be retrained to work in the other. Only the basic principles of probability cut across the two.

197I. Bug-ridden warehouse cleaned up when new insecticide was sprayed.

McAlister, L. C. Jr. *Food Ind., 21,* 9 (1949).

Pyrenones properly compounded and applied, control not only flies, mosquitoes, roaches, ants and other customary pests, but also are unusually effective against the mites and skippers which annoy meat packers and cheese plant operators. The spectacular overnight cleanup of the flour storage warehouse shows how completely the grain-destroying insects infesting flour, feed and cereals may be destroyed.

198I. Cockroaches found to harbor food poison.

Olson, T. A. *Sci. N. L., 55,* 83 (1949).

Salmonella deposited on food or dishes in cockroach excreta were found to remain alive for a month. Carbonated beverage bottles can be kept germ free on the outside when the water, in which they are kept cool, is changed weekly and a sanitizing agent such as quaternary ammonium compounds or chloramine T are added.

COURSE IN FOOD TECHNOLOGY

University of Miami

The University of Miami announces a four year course in Food Technology, leading to a B.S. degree. The curriculum will follow recommendations of a committee of the Institute of Food Technologists. In addition to the very modern classroom and laboratory facilities of the University, a small-scale processing plant will be operated to provide students with actual plant experience. Canning, freezing, processing, and packaging operations will be included. Summer classes will be arranged for those who wish to obtain practical experience in various types of commercial food plants during one of the winter terms.

Much food is raised in the southeastern states and in the Caribbean countries, but, except for citrus, comparatively little is processed or packaged. This new course in Food Technology is being established to meet the needs of this area; emphasis will be placed upon processing tropical foods, and upon sanitary problems to be found in tropical countries.

At present, the staff consists of Dr. A. L. Stahl, Professor of Food Technology, who is Director of the Food Technology Laboratory and of its research program; J. Arthur Lewis, Associate Professor in charge of food technology instruction; Milton Kaplow, and Miss Margaret Jean Mustard, Assistant Professors of Food Technology.

SHORT COURSE AT M. I. T.

A short intensive course in Food Technology will be offered at Massachusetts Institute of Technology during the 1949 summer session. The course is intended particularly for persons who wish to broaden their perspective in food fields or to increase their technical abilities but who have at their disposal limited time for study. Classes will be held daily except Saturday, from 9:00 A.M. to 4:00 P.M., June 13th to July 1st, inclusive.

The course will cover Economics and Statistics in Food Supplies, Equipment Used in New Processes, Flavor and Food Acceptance, Food Bacteriology, Sanitation and Fermentation, Food Chemistry and Nutrition, Food Cost Acounting and Business Law, Food Electronics, Food Nutrients as Affected by Processing Methods, Food Packaging, Labor Relations, Materials Handling, Unit Processes in Food Engineering, as well as Food Processing in several fields.

The following paragraphs are taken from the printed leaflet announcing the course:

"The groundwork of food technology is essential to the food-manufacturing executive, the food-research and plant-control chemist, the refrigeration engineer, the food-equipment designer, the governmental food-control and health official, teachers in allied fields, the nutritionist, those concerned with the purchase and sale of foods, and persons desiring to enter the food industries and associated fields in a technical or production capacity.

"The marked technological progress taking place in modern food industries has created a demand for personnel having knowledge of the basic sciences pertaining to foods and familiarity with the technical processes of food production, manufacture, storage, and distribution, together with certain techniques used therein."

A. S. B. C. NEW ORLEANS MEETING

The steady growth of the American Society of Brewing Chemists was evidenced by a record attendance of more than 220 members at the New Orleans meeting, April 10th-14th.

Progress Reports were submitted by the Technical Subcommittees on "Malt Check Samples" (L. A. Hunt, Chairman); "Bacteriology" (S. R. Green); "Alpha Amylase Measurement" (Sutton Redfern); "Sampling" (Eugene Becker); "Bottle Testing" (T. B. Parks); and "Determination of Iron in Beer" (Irwin Stone). Further strides toward the standardization of reliable procedures for the objective evaluation of "Color of Beer and Wort" were made in the form of individual papers by members of the Color Committee, R. B. Petersen, and Irwin Stone and M. C. Miller.

Three half-day sessions were devoted to the presentation of 16 scientific papers, which were followed by discussions. There was evidence of a widespread response to the challenge of research among the membership and of an increased use of statistical tools for the evaluation of analytical results.

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Selected Abstracts

ANALYTICAL METHODS

199I. Determination of moisture in some protein materials. Use of Karl Fischer reagent.

McComb, E. A. *Anal. Chem., 20,* 1219-21 (1949).

Fischer reagent has proved adaptable for the determination of moisture in protein materials such as chicken feathers, dried egg white, gelatin, hog hair, gum gluten, soybean protein, and zein.

200I. Chromatography of amino acids on starch columns. Solvent mixtures for the fractionation of protein hydrolysates.

Moore, S., and Stein, W. H. *J. Biol. Chem., 178,* 53-77 (1949).

Chromatographic fractionation of amino acids on starch columns has been extended to include most of the common constitutents of protein hydrolysates. Synthetic mixt. containing 17 amino acids and ammonia, yield a single chromatogram curve for all components with a few overlaps. By the use of three starch columns, it is possible to separate all eighteen components. Average recoveries have been 100± 3%. About 2.5 mg. of amino acid mixt. required for analysis.

201I. Separation of the saturated straight-chain fatty acids C_{11} to C_{17}.

Ramsey, L. L., and Patterson, W. I. *Assn. Off. Agr. Chem., 31,* 441-52 (1948).

A method based on partition chromatography, is presented for the separation of the straight-chain saturated fatty acids C_{11}-C_{19}. The separation of the even-numbered acids from each other and of the odd-numbered members from each other is fairly complete in a single fractionation and recoveries of added acids are essentially quantitative. The fatty acids are separated on a column of silicic acid using a mixture of furfuryl alcohol and 2-aminopyridine as the immobile solvent, and n-hexane as the mobile solvent. The separation is followed by titration of percolate fractions of suitable volume with standard sodium ethylate, and the separated acids are determined by titration in 70% alcohol with standard NaOH. Each acid is tentatively identified by its threshold volume, and the identification is confirmed either by a m. p. determination or by adding an approximately equal amount of an authentic sample of the suspected acid to the unknown and testing the chromatographic homogeneity of the mixture on a fresh column.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

202I. Further study of the antioxygen properties of certain carotenoids.

Herisset, A. *Bull. soc. chim. biol., 30,* 187-95 (1948); *J. Am. Oil Chem. Soc., 26,* 34-5 (1949).

β-Carotene and vitamin A were shown to inhibit the spontaneous oxidation of oils and fats, and also to inhibit the action of oxidases of fungi on various substrates under certain conditions.

203I. Tests prove radioactivity doesn't speed plant growth.

Sci. N. L., 55, 104 (1949).

Radioactive elements, as such, do not make plants grow faster. The tests were run to repeat on a critical and controlled basis the conditions claimed to produce greatly increased plant yields from the bombed soil of Hiroshima.

MICROBIOLOGY

204I. The training of bacteria to new carbon sources.

Bact. lactis aerogenes and d-arabinose.

Jackson, S., and Hinshelwood, C. N. *Trans. Faraday Soc., 44,* 568-74 (1948).

The organism was trained to utilize d-arabinose, and in several different ways, it was shown that resting cells should remain in contact with the new sugar for a given total time. Mixtures of the old and new carbon sources do not cause adaptation to take place. It is shown mathematically that the participation of a mutant requiring the new carbon is not the reason for the phenomenon. Apparently, the cells contain dormant enzymes that must be activated.

205I. The fermentation of cellulose in vitro by organisms from the rumen of sheep.

Marston, H. R. *Biochem. J., 42,* 564-73 (1948).

Environmental conditions similar to those of the normal rumen were employed for the fermentation in vitro of cellulose by microorganisms separated from actively fermenting rumen contents. Fermentation products were acetic acid, propionic acid, CO_2, CH_4 in the main, and small quantities of formic acid, butyric acid, acetaldehyde, pyruvic acid, and lactic acid. Energy relationships of the fermentation are given.

NUTRITION

206I. The animal protein factor.

Bordens Rev. Nutr. Res., Oct., 1948; *J. Am. Vet. Med. Assn.,* 114, 250, Apr., 1949.

Experimentation indicates that the A. P. F. may be identical, or closely related to vitamin B_{12}. In hens, a diet low in the A. P. F. resulted in lowered hatchability. In the female rat, low A. P. F. diets resulted in a higher infant mortality.

(Abstracts continued on page 4)

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 2)

207I. Studies on the adequacy of human milk and artificial human milk for the rat.

SCOTT, M. L., AND NORRIS, L. C. *J. Nutr., 37,* 337-51 (1949).

Mature human milk, even when supplemented with vitamins and minerals to meet the known requirements of rats, is entirely unsuitable as a diet for the rat. Human colostrum, supplemented in a like manner, does support a slow growth. An artificial human milk formulated to contain the same gross chemical composition as that of human colostrum promoted approximately the same growth. Artificial human milk containing a slightly higher level of protein promoted considerably better growth. The failure of rats to grow on human milk is probably due to: (1) Insufficient protein, more particularly methionine; (2) a deficiency of the unidentified factors; and (3) a level of lactose in excess of that which can be tolerated by the rat. The rat is a poor experimental animal for use in attempting to evaluate a food for young infants.

208I. Fluorides and hardness of tooth enamel.

Nutr. Rev., 7, 41-43, Feb., 1949.

A review of the effect of fluorides on hardness of tooth enamel. Apparently flourides by topical application to "in vitro" teeth can increase the hardness of enamel, but more accurate test measurements must be devised before an acurate estimation can be made of this effect in the mouth of a living animal.

209I. Sulfur balance indexes of casein in adult dogs with and without addition of DL-methionine.

ECKERT, J. N. *Arch. Biochem., 19,* 379-87 (1948).

Methionine is known to exert a marked protein sparing effect, decreasing as reserve protein stores are depleted. Methionine also exerts a sulfur conservation effect. In positive sulfur balance, added methionine not utilized is not excreted as such, but as inorganic sulfate in the urine. The urinary S/N ratio decreased with increasing absorption of casein sulfur. The addition of methionine increased this ratio in the region of positive sulfur balances.

210I. The pantothenic acid requirements of chicks receiving a purified diet.

HEGSTED, D. M., AND RIGGS, T. R. *J. Nutr., 37,* 361-7 (1949).

The minimum requirement of pantothenic acid for maximum growth of young chicks receiving a purified diet was estimated to be approxmiately 900 μg per 100 g. dict.

211I. Stability and utilization of vitamin A emulsions in mixed feeds.

HALPERN, G. R., MARCH, B., AND BIELY, J. *Poultry Sci., 28,* 168-72 (1949).

Practical chick feeding experiments have been carried out with vitamin A emulsions and feeding oils mixed into the ration. They revealed no difference in biological action or stability of the vitamin A in either form when mixed and stored in the ration.

212I. Carotene from vegetable leaf wastes compared with vitamin A in laying rations.

SKOGLUND, W. C., TOMHAVE, A. E., AND MUMFORD, C. W. *Poultry Sci., 28,* 298-300 (1949).

In most cases carotene from dehydrated vegetable waste in the form of a concentrate is just as efficient as vitamin A esters from fish liver oil in maintaining egg production, feed consumption, and hatchability in laying pullets.

213I. The sulfur amino acid requirements of turkey poults.

KRATZER, F. H., WILLIAMS, D. E., AND MARSHALL, B. *J. Nutr., 37,* 377-83 (1949).

Young turkey poults were fed rations containing an isolated soybean protein to which various additions of cystine and methionine were made. Approximately 0.5% methionine and 0.3% cystine were required for the optimum growth of the poults on a 24% protein ration.

FOOD PRODUCTS

CEREAL AND GRAINS

214I. Milling process for granular food crop products, including fling impacting in breaking and finishing operations.

CARTER, R. J. S., AND MCDONALD, H. Assignors to Pillsbury Mills, Inc. 2,464,212, Mar. 15, 1949.

The process of milling that class of natural granular food products comprising wheat, rye, corn, beans, soybeans, and peas, which consists in first centrifugally moisture conditioned granules in natural whole form, at high velocity, against impaction surfaces to shatter the same, disintegrating the friable endosperm portions and breaking away the germ from endosperm and hull, then separating out the germ in substantially whole form and separating out also the larger hull portions containing endosperm particles adhering thereto and thereafter centrifugally fling-impacting hull portions to loosen and disintegrate the endosperm adhering thereto, collecting the disintegrated endosperm from impacting operations and reducing and dividing by a separate fling-impaction step.

DEHYDRATED FOOD

215I. Refrigerated storage of dried fruits.

PENTZER, W. T. *Ice and Refrig., 116,* 57, April, 1949.

Storage of dried fruits at approximately 32° F. with 40° F. as an approximate upper limit, and also at low humidity, is of sufficient value to the dried fruit industry generally to justify such storage as standard year-round practice. Low-temperature storage controls browning, particularly for dried apricots and peaches, but also for apples, pears and nectarines, and even for whole fruits such as prunes and figs. At the low temperature mentioned, insects such as raisin moths and dried fruit beetles, which commonly infest dried fruits, are dormant and are gradually killed. Flavor, texture, color and vitamin content of dried fruits are protected notably and significantly at low temperature. Low humidity controls sugaring, both externally, and internally, which affects raisins, figs, and prunes and to a minor extent, apricots. Avoidance of high humidity and in some instances of even moderate humidity is necessary to prevent mold and sugaring. For this reason, a temperature of about 31 or 32° F. is safer and better than 40° F.; however, low humidity is important at 31 to 32° F. as well as at higher temperature of 40° F.

216I. Removing ultimate moisture from powdered products.

BEARDSLEE, A. C. Assignor to The Borden Co. 2,465,963, Mar. 29, 1949.

The process of removing ultimate moisture from a powdered food product which comprises continuously feeding the powdered product through a vacuum drying chamber wherein the pressure does not exceed that corresponding to about 20 mm. of mercury absolute pressure, externally heating the product during its passage through chamber, bleeding in controlled amounts of air to assist in the movement of powdered product through said drying chamber and to disperse product, whereby evaporation of moisture is favored and local overheating prevented, agitating and cooling powdered product under vacuum, separating evolved vapor from powdered product while it is being agitated and cooled, and discharging dried powdered product to a storage receptacle.

FISH AND SEAFOOD

217I. The problem child of wastes turned into profits.

Fish Gaz., 66, 38-9, Mar., 1949.

Waste liquid from fish processing plants is separated into meal, oil and condensed fish solubles, with only the condensate

(Abstracts continued on page 10, following technical papers)

Institute of Food Technologists

The Professional Society of Food Technologists

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Membership

Write to regional secretary, if within an area covered by a regional section, or to the Secretary of the Institute, for an application form and information regarding qualifications and classifications.

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News of the Institute

HONORS TO DR. DEUEL

At the May 18 meeting, the Southern California Section had as honored guest one of their members upon whom two outstanding honors have recently been conferred. In April, during a meeting of the Federation of American Societies for Experimental Biology, Professor Harry J. Deuel, Jr., Head of the Department of Biochemistry and Nutrition of the University of Southern California, received the Borden Award for his achievements in research in Nutrition. A few days after his return to the University of Southern California campus, the administration announced his appointment as Dean of the Graduate School.

DR. HARRY J. DEUEL, JR.

Dr. Deuel is well known in the field of research. His interest in the nutritive value of fats began in 1919 when he was employed in the U. S. Department of Agriculture, where he worked with Arthur D. Holmes on the digestibility of animal and vegetable fats together with various hydrogenated oils. He received the B.A. degree from Carleton College in 1918. His abilities in research were further strengthened by work under Lafayette B. Mendel at Yale University, from which institution he obtained a Ph.D. degree in 1923.

The next five years were spent at Cornell University Medical School, where the influence of Graham Lusk was a stimulation in his work in energy metabolism. Here also his early studies in phlorhizin diabetes were conducted. Such studies, along with later investigations, have contributed much to the knowledge of the interrelationships between carbohydrate and fat metabolism.

After a year at the University of Maryland as Professor of Physiology, Dr. Deuel was appointed to the chair of Biochemistry at the University of Southern California where the School of Medicine had just been reestablished.

During the succeeding years, his many interests have brought about much coordinated research between the University and industry and have helped a number of students to obtain advanced degrees. Under grants from companies such as Best Foods, Inc., Swift and Co., Proctor and Gamble, and Lever Bros., he has been able to initiate in his laboratory and direct studies on the digestibility and the nutritive value of both natural and hydrogenated fats of animal and vegetable origins. Through studies on growth and reproduction over many generations of rats, he has concluded that no differences are apparent in the nutritive values of fats attributable solely to their classification as either vegetable or animal.

His work on vitamin A and the ability of various carotenoids to act as provitamins A has made him an authority in this field. When the National Association of Margarine Manufacturers became interested in the stability under storage of vitamin A in butter and margarine, Dr. Deuel was asked to undertake the study. He has cooperated with the dairy industry in studies of enrichment of the vitamin A content of milk by dietary means.

His success in associations with students, fellow faculty members, and the administration has also helped to put him in his present place of honor. This is attested to not only by his appointment as Dean of the Graduate School but also by the enthusiasm with which his colleagues have received the announcement. Dr. Deuel expects to continue his research in the field of fats.

Regional Section News

CHICAGO SECTION

On May 23, the Chicago Section was addressed by Mr. Otto Eisenschiml of the Scientific Oil Compounding Co., Chicago. The topic of his address was "Solving a Murder Through Chemistry."

Effective May 23, Mr. O. G. Braun of the American Can Co., Maywood, Ill., became Secretary of the Chicago Section. Mr. Braun replaces Dr. J. M. Jackson, who is moving from the Chicago area to a post in the American Can Company's Pacific Research Division.

Mr. Morris H. Katz, of Martin Food Products Inc., spoke on "The Role of Food Technology in the Modern Food Processing Organization" at the National Food Brokers Association Convention on March 23.

Dr. William J. Shannon has been appointed General Product Controller for Oscar Mayer & Company.

Mr. Robert I. Tenney and Mr. Fred A. Wilcox of the Wahl-Henius Institute attended the annual meeting of the American Society of Brewing Chemists in New Orleans, April 10-14. While there, Mr. Tenney presided at a technical session.

Mr. Victor Conquest has been placed in charge of all scientific research activities in all divisions of Armour and Company, reporting directly to the President.

Messrs. C. K. Wiesman and R. W. Bates, of Armour and Co., attended the Spring Meeting of the American Oil Chemists' Society.

(Regional Section News continued on page 9, following technical papers)

Notes and Letters

Thanks for Your Letters!

The response to our request for suggestions for cutting publishing costs of FOOD TECHNOLOGY has been gratifying. Criticism has been constructive and suggestions objective.

For the benefit of those who may have like or unlike views concerning the policies to be adopted, we summarize the opinions already received and abstract some of the typical responses:

1. Eliminate Section Notes.
2. Discontinue Abstracts.
3. Restrict news to those items which are topical and timely.

Here are some typical replies:

"I would suggest the elimination of Section Notes, then—if absolutely necessary—the abstracts. Chemical Abstracts covers the field very well and frankly I think their abstracts are better. Don't cut down on Editorial Comment. That is too good. If these cuts won't do the job, try to teach the contributors the advantages of brevity."

* * * *

"I would especially hate to lose the Abstracts but I could gladly forego Regional Section News, which I never read anyway.

"Is it a good suggestion to say that in the articles the tables are too complete? Certainly we can say something like that about graphs, for when a commentary goes with them in the text, a neat free-hand sketch almost without data can be more arresting than your 'copper-plate' jobs."

* * * *

"I am writing because of the mention under 'Notes and Letters' in the April issue that 'clipping' of the Journal was about to occur because of lack of revenue to cover expenses. Personally, I would rather see the length of some of the technical papers cut down (if this would save an equivalent amount in production cost) than eliminate Section Notes, Abstracts or Editorials. . . .

"Unless the Council has set up a policy which restricts the solicitation of advertisements, I should think the food industry itself, but more important, the supplying industries should realize that it is the Food Technologists, not the plant managers who specify the Brand of Valve or Screen the firm should buy. Perhaps, if an engineering article were to be included in each issue it would be easier to convince administrators of the industry's advertising funds that such are the facts. . . ."

* * * *

"In the April issue you asked for comments on means of reducing expenditures and amending editorial policies for FOOD TECHNOLOGY. I am always willing to offer my cures for any of the world's ills from ingrown toenails to control of the atom bomb, so there is no reason why I should overlook our own publication.

". . . Now for the news of the association. It invariably reaches us two to three months late and therefore should be classified as history rather than news. I believe that some efforts should be made first to publish more recent items as news, and to reject the older ones. Secondly, the news as it has been published has been of little value because it has been largely in generalities, and has the general aspect of being 'canned.' You always feel that you have read the same thing two or three times before. In the form that it is published there is very little life to it. Far too much space is devoted to section activities, and far too little space is devoted to news outside the Institute which is of interest and value to the members. Also, there is far too little news about the general membership; it is limited almost exclusively to that small handful to whom we entrust the affairs of the society; we hear and see plenty of these people anyway. And finally, the news pages could and should be livened up a little with photographs. . . .

"My suggestion would be to publish FOOD TECHNOLOGY for the alternate months January, March, May, July, September, and November, and to publish *Food Technology News Edition* on the alternate months February, April, June, August, October, and December. The news edition should have the same size and the same general format as the regular edition. It could well be printed on a cheaper grade of paper. It should include certain improvements such as I mentioned above. Most important of all it should be printed by a more economical printing method than is used in publishing FOOD TECHNOLOGY at present. Such an edition would lend itself very readily to publish by lithoprinting; instead of type-setting the Vari-Typer or other improved typewriter could be used, none of which would involve any appreciable additional costs for cuts. . . ."

* * * *

". . . Personally if a part of FOOD TECHNOLOGY must be discontinued or reduced I would prefer to see Abstracts first affected and then book reviews. Sectional news and editorials both are essential in aiding to preserve the interest and morale of the organization."

* * * *

". . . I vote for discontinuance of the abstract section. I believe that the Institute can not do a reasonably good job on abstracts until its finances are greatly improved and it can afford to set up a board of abstracters which would do a reasonably good job of covering the entire field of food technology. Even then I am in doubt as to the justification of the Institute duplicating a long established abstract service that the American

Chemical Society and other organizations have been providing. However, on this second point I am open to conviction that the Institute should render this abstract service to its members when and if its finances will permit. . . .

"With respect to Book Reviews, my thinking runs somewhat along lines similar to my thinking with respect to abstracts. However, I think there is more justification of our running Book Reviews in FOOD TECHNOLOGY, particularly if they can be run very quickly after the book has been published. I do believe, however, that a space given over to book reviews can be cut down. . . .

"In regard to editorials, I pass. I am not much of a believer in editorials just to fill up white space. At the same time I believe that if FOOD TECHNOLOGY is going to be the official organ of the Institute, it should have pages available for editorial comment on subjects of controversial nature yet of importance to the food technologist and particularly to the Institute.

"Any comment which I express with respect to news is that the news section should be expanded, if at all possible; certainly not curtailed. . . . What we want is more and more news regarding the activities of the Institute as a whole, including committee reports, financial statements and news from the various Sections and regional groups. I believe that we should delete some of the trivia from these sectional or regional group news which would be of local or relatively local interest at best. . . . "

* * * *

"Re: Your request for Squawks, etc.:

1. I vote to eliminate Section Notes.

2. I vote to keep editorial comment well under control. Make it short and sweet. 'No souls saved after the first 50,000 words.'

3. Consider limiting abstracts to difficultly procurable articles.

4. Number the pages uniformly in the magazine. I fail to get anything but an irked feeling when I see page 6 followed by page 111 and page 146 by page 7. Sounds screwy to me!"

* * * *

Seven Regional Sections have reported votes of their members as follows:

SECTION I

	First Choice to Discontinue	Second Choice to Discontinue
Abstracts	3	3
Book Reviews	11	1
Editorials	3	1
Local News	16	5
National News	0	0

	First Choice to Reduce	Second Choice to Reduce
Abstracts	0	0
Book Reviews	10	0
Editorials	2	0
Local News	0	0
National News	0	0

"It was the opinion of this section that more of an effort should be made to get paid advertising so that none of the sections mentioned above would have to be discontinued."

SECTION II

	First Choice to Reduce	Second Choice to Reduce
Abstracts		
Book Reviews		X
Editorials		
News	X	

SECTION III

	First Choice to Discontinue	Second Choice to Discontinue
Abstracts	1	1
Book Reviews	4	7
Editorials	1	4
News	11	2

SECTION IV

	First Choice to Discontinue	First Choice to Reduce
Abstracts	4	1
Book Reviews	0	0
Editorials	0	1
News	2	0

SECTION V

	First Choice to Discontinue	Second Choice to Discontinue	First Choice to Reduce	Second Choice to Reduce
Abstracts	19	12	8	16
Book Reviews	24	17	16	9
Editorials	13	9	20	13
News	16	11	15	10

SECTION VI

Section	First Choice to Discontinue	Second Choice to Discontinue	First Choice to Reduce	Second Choice to Reduce
Abstracts	21	10	8	7
Book Reviews	18	19	9	8
Editorials	4	5	17	8
News	4	4	8	15

SECTION VII

Section	First Choice to Discontinue	Second Choice to Discontinue	First Choice to Reduce	Second Choice to Reduce
Editorial	—	X	—	X
News	X	—	X	—

The liberty that this editor has exercised in selecting the material reproduced is not a reflection of his lack of interest in many other topics developed in the letters. The "surgery" performed was purely in the interest of conserving space. Anyone who recognizes his foreshortened suggestions and wishes to be quoted more fully should let us know his wishes.

To those of you on the verge of writing us: "Obey That Impulse!"

Regional Section News

(Continued from page 6, preceding technical papers)

Mr. B. M. Shinn, of Armour and Co., gave a paper on "Nutritive Aspects of Meat and Meat Products" at the Institute of Public Health Practices for Veterinarians, sponsored by the Illinois Department of Public Health, in Springfield in March.

Mr. Wayne Marcoux has been named Section Head in charge of the Packaging Pilot Plant, Armour and Co.

Mr. William M. Fosdick has been appointed General Manager of Veal Sales in Southeastern United States for Armour and Co. His headquarters will be in Birmingham, Alabama.

At the annual meeting of the Nutrition Foundation, held in May at Skytop, Pa., Dr. L. E. Clifcorn of the Continental Can Co. gave a talk on "Research on the Nutritive Quality of Canned Foods." Mr. C. C. Conway, of the same company, closed the meeting with a talk on "The Viewpoint of a Trustee."

D. G. Heberlein of the Continental Can Co. has been elected President of the Association of Vitamin Chemists for 1950. He was on the Board of Directors for 1949 and was secretary of the Association two years ago.

NORTHERN CALIFORNIA SECTION

DeWitt F. Sampson, Assistant Manager of the American Can Company's Pacific Research Division, was transferred in June to the Central Laboratory at Maywood, Ill., as Section Chief.

The May issue of *The Hornblower* is devoted entirely to information about the Annual Meeting of I. F. T. in California in July. The editors are to be congratulated on the thoroughness and excellence of presentation of all pertinent details about the Convention. This issue of *The Hornblower* represents a valuable handbook about the 1949 Convention program.

The Entertainment Committee for the National Convention was enlarged and finally included the following members: Dick McKirahan and George Harnik (Co-Chairmen), Prescott Lloyd, L. R. Van Auken, Myron Powers, Jack Shaver, Abe Mittler, Herb Lipke, Sherman Leonard, and Mrs. Ilma Dolan.

At a meeting of the Executive Committee held on May 19 it was announced that E. A. Seipp, of Golden State Co. and a former member of the Chicago Section, has become a member of the Northern California Section. In addition the following applications for membership were approved:

R. D. Armstrong, The Welch Grape Juice Co.

Henry Ball, F. M. Ball & Co.

T. D. Barlow, The Barlow Co.

H. M. Buley, S & W Fine Foods, Inc.

B. J. Butler, Atlas Pacific Eng. Co.

Alice R. Collings, Western Regional Research Laboratory.

J. C. Connell, American Can Co.

Dave Eolkin, Gerber Products Co.

E. W. Flavell, Holly Sugar Corp.

L. F. Jents, Doughnut Corp. of America.

A. A. Kloss, Western Regional Research Laboratory.

T. M. Lukes, student.

R. D. Mathews, S & W Fine Foods, Inc.

B. E. Monroe, Standard Brands, Inc.

J. J. O'Connell, Silveira & O'Connell.

C. F. Pinney, Langendorf United Bakeries, Inc.

NORTHEAST SECTION

On May 14, the Northeast Section held its final meeting of the season at the Goessmann Chemistry Laboratory, University of Massachuetts, Amherst. Mr. Malcolm B. Hall, Director of Training, Foxboro Instrument Company, Foxboro, Mass., spoke on "Instrumentation and Control in the Food Industries." Dr. A. F. Blakeslee, Professor Emeritus of Smith College, gave an address and demonstration on the "Differences Between People in Taste and Smell."

"Odor Identification and Thresholds" was the subject of a paper and discussion from the floor, led by Loren B. Sjöström, at the meeting of the Manufacturing Chemists' Association in New York, on April 19. Mr. E. C. Crocker collaborated in the preparation of the paper. Both are connected with Arthur D. Little Inc., Cambridge, Mass.

Mr. E. C. Crocker continues his speaking engagements, having given a talk at Rhode Island State College on May 6.

A short summer program in Food Technology was offered by the Massachusetts Institute of Technology during the period from June 13 to July 1. This program was under the direction of the following members of the Department of Food Technology, Massachusetts Institute of Technology (all members of the Northeast Section of I. F. T.): Professors W. L. Campbell, C. G. Dunn, E. E. Lockhart, R. S. Harris, and B. E. Proctor.

SOUTHERN CALIFORNIA SECTION

The following officers have been elected for the 1949-1950 season:

Chairman: Louis B. Rockland, Chemistry Department, University of California, Los Angeles 24, Calif.

Vice-Chairman: F. Leslie Hart, U. S. Food and Drug Administration, 1401 S. Hope St., Los Angeles, Calif.

Secretary-Treasurer: Margaret G. Morehouse, Department of Biochemistry and Nutrition, University of Southern California, Los Angeles 7, Calif.

Executive Committee: Gordon L. Merchant (1949-1951), Merck and Co., 1855 Industrial St., Los Angeles, Calif. Franklin H. Hunsicker, Continental Can Co., 3820 Union Pacific Ave., Los Angeles, Calif.

Section Councilors: Max S. Dunn (1949-1951), Chemistry Department, University of California, Los Angeles 24, Calif. Arthur N. Prater (1949-1951), Gentry Inc., 837 N. Spring St., Los Angeles 12, Calif. Alternate: Marsden Burns (1949-1951), 2460 E. Glenoaks, Glendale 6, Calif.

Local Executive Committee: Arthur N. Prater (1949-1950 as retiring Chairman). George H. Bowen (1948-1950), Mission Dry Corporation, 5001 S. Soto St., Los Angeles, Calif. Raymond E. Cox (1948-1950), Bireley's, 1127 N. Mansfield Ave., Los Angeles 38, Calif.

The national officers are as follows:

Councilor: E. A. Beavens, U. S. D. A. Bureau of Agricultural and Industrial Chemistry, 263 So. Chester Ave., Pasadena, 5, Calif.

Section Councilor, Budget and Finance Committee: Philip K. Bates, United Rexall Drug Co., 8480 Beverly Blvd., Los Angeles 36, Calif.

Chairman, Publicity and Program Committee: Arthur N. Prater, Gentry Inc., Los Angeles 12, Calif.

Chairman, Membership Qualifications: E. M. Choce, 1842 N. Gramercy Place, Los Angeles, 28, Calif.

PHILADELPHIA SECTION

On May 12, the Philadelphia Section held a dinner meeting, following which Dr. Jackson B. Hester of the Campbell Soup Co. spoke on "Fertilizers and Foods."

The following officers have been elected for the 1949-1950 season:

Chairman: Lincoln S. Hyde, Packing Department, American Stores Co., 424 N. 19th St., Philadelphia, Pa.

Vice-Chairman: E. Everett Meschter, American Preserve Co., 3rd St. and Lehigh Ave., Philadelphia, Pa.

Secretary: Robert C. Bucher, Frank H. Fleer Corp., 10th and Somerville Sts., Philadelphia, Pa.

Treasurer: Arthur D. Bowers, Campbell Soup Co., 100 Market St., Camden, N. J.

Councilor (for 2 years): John J. Sampey, Abbotts Dairies, Inc., 238 Lombard St., Philadelphia, Pa.

Executive Committee: Graydon V. Cass, Crown Can Co., Erie Ave. at H St., Philadelphia, Pa. Claude H. Hills, Eastern Regional Research Laboratory, U. S. D. A., Philadelphia, Pa.

MARYLAND SECTION

On May 13, the Maryland Section held a dinner meeting at which Mr. Paul Kircher, Chief Chemist of the Maryland Glass Corporation of Baltimore, spoke on "The Manufacture of Glass Containers for Food Preservation." Mr. Kircher's talk was illustrated with interesting demonstrations and experiments.

IOWA SECTION

On May 6, the Iowa Section was addressed by three speakers. Dr. Howells of the Quaker Oats Co. spoke on the history, development, and uses of furfural in synthetic rubber, rosin, nylon, paint, and other products. Mr. Wayne Flickinger of the Cherry-Burrell Co. discussed the different types of equipment made by his company. Mr. John Kooreman of Penick and Ford described the operations of his company in processing field corn and manufacturing products therefrom.

Guests present at the May meeting were Dr. Howard Lightbody (Quartermaster Corps, Chicago); Bob Stewart, Harlan Lortz, Joe Hoaglund, and Al Pin (Penick and Ford); Wayne Flickinger (Cherry-Burrell Co.); Earle Waffle (Wilson and Company); W. Bechtel (Corn Industry Research Foundation); Buck Grange and Ross Grange (IOA Foods); Phil Duval and Dr. Howells (Quaker Oats).

Members of the Program Committee for the coming year are John Kooreman (Chairman), LaVern Drake (American Can Co.), and Frances Carlin (Iowa State College).

Abstracts

(Continued from page 4, preceding technical papers)

remaining to be eliminated in evaporation by the Sharples-Lassen process. H_2SO_4 is mixed in stickwater at 150° F. A pH is established which arrests enzymolysis until the separating process has been completed. The proteins which impart the objectionable odor and make the solubles susceptible to fermentation are completely removed by continuous centrifuge, producing meal with a high riboflavin content. The oil is then separated from the liquor by centrifuging, and the remaining stickwater is put through evaporators which yield condensed fish solubles containing approximately 50% solids.

FROZEN FOOD

218I. A new method of freezing eggs in the shell and its possibilities for further application on freezing foods in general.

KALOYERAS, S. A. *Science, 109,* 171-3 (1949).

The problem was to reduce the water content to the extent needed to provide space for the expansion of the ice formed by freezing. Elimination of 2-3% was sufficient for freezing eggs under vacuum without cracking. Under these conditions, the treatment does not affect the quality of the eggs. The whipping quality of the white is somewhat improved.

219I. Effect of refreezing on quality of sea trout fillets.

POTTINGER, S. R., KERR, R. G., AND LANHAM, JR., W. B. *Comm. Fish. Rev., 11,* 14-16, Jan., 1949.

Preliminary tests indicate that immediate freezing of sea trout, with subsequenet thawing, filleting and refreezing of the fillets causes no marked adverse effect on quality over fillets prepared from freshly-caught fish and then frozen.

220I. Keep the temperature low when storing pork.

HALL, J. L. et al. *Refrig. Eng., 57,* 247-50 (1949).

Frozen pork loin roasts double wrapped, first in MSAT cellophane, then in freezer locker paper, were stored for periods up to 72 weeks at 10, 0, and —10° F. Other pork was stored at 0, —10, and —20° F. After 24 weeks of storage, the superiority of —10 and —20° F. over the higher storage temperatures for frozen pork was indicated. Better preservation of quality in pork stored at these low temperatures was indicated by high palatability scores, by the absence of peroxides, and by low fat acid numbers. Little or no effect was noted on shrinkage in storage or during cooking, on pH, on total or nonprotein nitrogen in either the tissue or in the press fluid, or on press fluid yield, which might be associated with either temperature or time of storage. It appeared that the freezing process may result in increased press fluid yield. There was some indication that longtime storage at any of the temperaturcs studied may result in an increase in resistance to mechanical shear. Vitamin retention was high throughout the study, indicating the stability of these vitamins during low temperature storage.

221I. Fat rancidity in eviscerated poultry. III. The effect of variations in dietary fat, ethanolamine and choline on the storage quality of mature turkeys.

HITE, J. R. et al. *Poultry Sci., 28,* 244-8 (1949).

The keeping qualities of eviscerated turkeys were compared after 4, 9 and 12 months of cold storage. These turkeys had been kept on two different basal rations, and had received supplements of choline, ethanolamine or fat. One basal ration was an experimental ration and the other a typical turkey ration. The acid, peroxide and aldehyde values of the fat extracted from the skins and the organoleptic tests of the unskinned carcass cooked under standardized conditions were used as a criterion for judging the keeping quality of the birds. These tests indicated that after four months of storage all the birds were acceptable. After nine months of storage all birds except those which had received supplements of 2% hydrogenated fat, 10% alfalfa leaf meal or 1% linseed oil were still acceptable, and after twelve months of storage, only those which had received

the typical turkey ration plus ethanolamine or choline were still acceptable.

FRUIT AND VEGETABLES

222I. Save on pea processing by using froth flotation.

Sci. N. L., 55, 141 (1949).

Floating is used to separate materials. Cracked peas, pea skins, nightshade berries and tar-weed seeds are now floated out of batches of peas in the way foreign material is floated out of ore. Developed at the U. S. D. A. Bur. of Agr. and Ind. Chem., the froth flotation process is expected to save an estimated two million dollars yearly in the cost of processing peas for canning or freezing.

223I. Status of parathion as insecticide for Florida citrus.

THOMPSON, W. L., STEARNS, C. R., AND GRIFFITHS, J. T. *Citrus Ind., 30,* 5-8, Mar., 1949.

Parathion killed Florida red scale and purple scale in concentration varying from 0.15 to 0.5 pounds of the active ingredient per 100 gallons. It was effective for scale control when combined in sprays with neutral compounds of zinc and copper, wettable sulfur and borax. The toxicity of parathion did not appear to be seriously affected where the minimum amount of lime was used to neutralize zinz sulfate and manganese sulfate. The longest period of control of scale insects was obtained where the sprays were applied in either June, July or August. No relationship was found between the timing of parathion in either the degreening of fruit, formation of maximum solids in the juice of fruit, or shock to the trees. The active stages of purple mites and rust mites were killed, but the period of control was of short duration. Parathion was found to be toxic to mealybugs, cottony-cushion scale and lady beetles. The residual effect of parathion on the leaves was of short duration. Zero to a trace of parathion was found in the juice of oranges and grapefruit, but slightly more was found in the peel.

PHYSICAL CHEMISTRY

224I. Measurement of particle size.

HARTLEY, A. W. *Manuf. Chem., 20,* 108-12 (1949).

The methods may be classified as follows:

(1) Sedimentation methods, (a) Andreasen pipette, (b) hydrometer method (Klein), (c) pressure methods, (d) Oden's balance, (e) turbidimetric methods; (2) Elutriation methods, (3) Centrifuge methods, (4) Measurement by microscope, (a) optical microscope, (b) electron microscope.

225I. A contribution to the theory of the structure of protein fibres with special reference to the so-called thermal shrinkage of the collagen fibre.

LLOYD, D. J., AND GARROD, M. *Trans. Faraday Soc., 44,* 441-51 (1948).

The relation between the chemical constitution of the protein fibres of silk fibroin, collagen and elastin and the chemical nature of the solvents which produce radial swelling, axial shrinkage and solution, is considered. The fibres are held together by lateral bonds of several chemical types. The swelling of the fibres in organic solvents is due to a straining or rupture of some of the types of lateral links: the production of axial shrinkage is due to the breaking of at least one type of cross bond, thus allowing the molecules to shorten with a corresponding gain in entropy. If other kinds of lateral links are left intact, the solvent will produce only axial shrinkage, accompanied by rubber-like extensibility. Solvents which break all types of lateral bond cause solution of the protein. In fibres of silk fibroin the two types of lateral bond are the direct carbimino backbone link and a hydroxyl-hydroxyl link through the serine side chains, the former being opened by formic acid and both by cuprammonium. In collagen fibres there appear to be (1) a more labile salt link, (2) one (or more) more resistant hydrogen bonds. The salt link can be broken: (a) by displacement of a non-diffusible ion or by a diffusible ion or a co-ordinate group; (b) by reagents which cause considerable swelling of the fibres; (c) by an increase in the dielectric constant of the medium penetrating the fibre. The relationship between dielectric constant, shrinkage temperature and swelling of collagen in various aqueous mixtures is discussed. The hydrogen bond type can be broken by certain organic reagents such as m-cresol, foramide, formic acid, lactic acid and thioglycollic acid, all of which can dissolve the fibre. In the elastin fibre the presence of a high proportion of long non-polar side chains limits the possibilities of the formation of lateral bonds and this fibre normally exists with the backbone in random configuration. Since elastin is insoluble in many collagen solvents it must be bonded by a few cross bonds of high resistance, the chemical nature of which is as yet unknown. The sheath of the elastin fibre is much more resistant than the core.

I. F. T. EMPLOYMENT CLEARING HOUSE

At its annual meeting to be held in San Francisco, July 10-14, The Institute of Food Technologists will operate an Employment Clearing House to bring together employers and food technologists interested in new positions. Food Processors interested in using this service are invited to contact the Committee on Employment at the time of the meeting. Registration of candidates for employment will begin Sunday and continue throughout the sessions. Inquire at the I. F. T. Registration Desk for further directions.

WORLD FOOD APPRAISAL

The Food and Agriculture Organization of the United Nations, in its *World Food Appraisal,* May, 1949, gives facts on world production, trade, and consumption of main crops in 1948, compared with prewar and 1947. In terms of calories and nutrients, production in all continents was greater in 1948 than in 1947. In all continents except Europe and Asia, production in 1947 and 1948 was greater than the 1934-38 average production. In 1948, Europe produced 91% of that average and Asia produced 99% of that average.

Europe experienced more benefits than any other continent as a result of the increase in food supplies in 1948-49. Supplies of food per person increased by about 10% as compared with the previous year. The least benefit was experienced in Asia, primarily because of political disturbances and, in China particularly, because of monetary inflation.

Book Review

TRACE ELEMENTS IN FOOD, by G. W. Monier-Williams. John Wiley and Sons, Inc., New York, 1949, 511 pp., price $6.00.

Dr. Monier-Williams' long experience in food inspection work and his original contributions to the analysis of foods for various toxic elements, eminently qualify him to write such a treatise as this. He is presently chemist in charge of the Food Research Laboratory of the British Ministry of Health.

It is unfortunate that no better term than "trace elements" has been found to describe inorganic elements present in foods not merely as contaminants, through ignorance, carelessness, accident or design, but as micronutrients whose importance is on a par with that of the vitamins. Avoiding a functional classification which might indeed involve many controversial aspects, the author has defined trace elements, for the purpose of this book, as those which may be present in the human body and in most foods in amounts up to 0.005 per cent. This, of course, includes iron which is present in such limited concentration in many foods. Certainly for this nutritionally essential trace element, as for iodine, and possibly for copper, manganese, cobalt and others, it may justly be said that never have so many owed so much to such "traces."

The author devotes his twenty-eight chapters to discussions of thirty-six trace elements, each chapter being devoted to a single element except the last two which concern barium, strontium, "lithium and other metals." The role of these elements in human and animal nutrition and in soil and plant growth is discussed and, as might be expected, many gaps in existing knowledge are indicated. The effects of deficiencies of elements essential to plant and animal life are considered. The absorption of nutritive or toxic elements by plants from soil (where they may be present naturally or added for insecticidal purposes) are discussed, as is also the availability, absorption and excretion of these elements by the animal organism.

Each chapter presents a summary of the best available information as to the content of the various elements in foods, and it is surprising to note how many of the so-called toxic elements are found in "normal" traces. For example, cadmium in amounts approximating one part per million and mercury in the order of 0.005 to 0.05 part per million occur in many natural foods. Especially interesting are the author's discussions of the principal sources of contamination by trace elements, for example insecticides and fumigants applied directly or indirectly, cooking utensils, storage containers, pipelines, soldered joints, refrigerants, etc.

The food analyst will derive much value from the authoritative discussions of methods for the determination of all these elements. Except for a few instances the methods are described in general terms so that the book serves as a critical guide to the choice of methods rather than as a laboratory handbook. The numerous literature citations are principally those of the past three decades extending up to about the mid-forties, although a few later references are given.

Among the modern techniques which appear to have been given too little consideration are emission spectrography and polarography. The principles of the latter technique are treated somewhat sketchily at one point in the book, but references are given there and elsewhere to practical applications of the procedure for analytical purposes. Notably lacking is a general discussion of the practice and limitations of spectrography. No reference is made to the microbiological methods which have recently been introduced for the determination of manganese and potassium. Procedures of this type show promise and should be watched with interest.

The book is well printed and bound, despite the fact it was produced in conformity with "the authorized economy standards." The text seems to be singularly free from typographical errors such as might be observed upon first perusal.

As the first important and authoritative work in this field in many years, Dr. Monier-Williams' opus will be off rather than on the shelves of many a food analyst's library for some time to come. BERNARD L. OSER.

TRADE-MARKS, by H. Bennett, Technical Director, Glyco Products Co., Inc. Chemical Publishing Company, Inc., 1949, 479 pages, price $10.00.

This book is divided into three main divisions. The first section is concerned with the legal aspects of trade-mark registration, and gives the rules of practice in trade-mark cases as published in the Federal Register for June 19, 1947 as well as the text of the new trade-mark law ("Lanhan Act") that became effective July 5, 1947. The Lanhan Act is interpreted and the difference between its provisions and those of the previous law are emphasized. The British Legal Requirements and the protection of trade-marks and their registration in foreign countries is discussed.

The second section of the book discusses the general types of trade-marks and the coining of words and suggests characteristics that should be considered when a trade-mark is being selected. This reviewer found the section on the making of words to be one of the most interesting in the book. Four different name finders are included with each copy of the book, each finder being used for the formation of words of specific vowel-consonant patterns.

The final portion, making up over half of the book, consists of the dictionaries of trade-marks classified as to the basic ideas suggested by the names and as to industry, a list of old trade-marks and their year of origin, an alphabetical list of trade-marks which is cross-referenced to a list of owners, and an alphabetical list giving the composition of trade-marked products. A list of books and trade journals concerned with trade-marks is cross-referenced to that classifying trade-marks according to industry.

The format of the book could have been improved. The paper is a cheap grade and some of the page arrangements are unattractive and crowded. Much of the material included in the book is available from other sources, but the author has rendered a service by assembling it in one volume. This reviewer feels that the book will be of particular value to those concerned with trade-marks and with the naming of new products and that others will find much of general interest.

W. H. CATHCART.

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Selected Abstracts

ANALYTICAL METHODS

226I. Determination of small amounts of oxygen in gases.

BRADY, L. J. *Anal. Chem., 20,* 1033-7 (1948).

The method is based on the oxidation by oxygen of the red reduced form of an alkaline solution of sodium anthraquinone β-sulfonate. The oxidized form is colorless. The oxidation and reduction of the reagent are reversible.

227I. Determination of nitrogen in organic materials.

HINDIN, S. G., AND GROSSE, A. V. *Anal. Chem., 20,* 1019-22 (1948).

Nitrogen in organic materials is customarily determined by either a Kjeldahl or a Dumas procedure. With the increasing usage of the mass spectrometer as a laboratory tool, isotopic methods of elemental chemical analysis have been suggested. A modification of the Dumas combustion in which the gaseous products are analyzed by the mass spectrometer, and an inert gas is used as an internal standard, is proposed. Though the method is still in a developmental state, the application of this type of analysis may be of interest in other fields, particularly in the determination of trace amounts of elements. RGM

228I. The separation of sugars.

FELLENBERG, T. V. *Mitt. Geb. Lebensmittel. Hyg., 38,* 265-91 (1947). French summary; *Nutr. Abst. Rev. 18,* 16 (1948).

After a study of methods for analyzing mixtures of sugars, details are given for the procedure recommended. Direct reduction and use of the volume method of Hadorn and von Fellenberg (Title 2489, Vol. 16) gives glucose, fructose, lactose and maltose. Glucose and fructose are estimated by using Barfoed's solution. Aldoses are estimated by oxidation with alkaline I solution, acidification and titration of the excess I. Fructose is estimated after oxidation of the aldoses. The first and last two estimations are repeated after weak acid inversion. Illustrations are given of the technique as applied to foodstuffs.

229I. Milk fat in milk chocolate.

FERRIS, L. W. *Assn. Off. Agr. Chem., 31,* 728-31 (1948).

One or two dioxane extractions in addition to the A. O. A. C. ether extractions are claimed to improve the yield of milk fat from milk chocolate.

230I. Test paper of urease and acid-base indicator for detection of urea.

COOK, J. W. *Assn. Off. Agr. Chem., 41,* 797-9 (1948).

Urease and brom thymol blue are combined in a dry test paper said to be extremely sensitive to urea as in urine contaminated products.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

231I. On two micro-methods after Linderstrom-Lang and coworkers.

THOMAS, J. B. *Chron. Naturae, 104,* 89-91 (1948); *Nutr. Abst. Rev., 18,* 283, No. 1641 (1948).

This is a brief review of two methods for estimation of enzyme activity. The first method, dilatometric, involves the measurement of changes in the specific gravity of a drop of reagent held in a liquid mixture in which there is a specific gravity gradient. The second method, gasometric, depends on the measurement of pressure changes in a modified type of Cartesian diver.

232I. The estimation of peroxidase activity.

ETTORI, J. *Biochem. J., 44,* 35-6 (1949).

The methods for the determination of peroxidase activity based upon the catalyzed oxidation of pyrogallol to purpurogallin by hydrogen peroxide have been re-examined. The effects of varying concentration of reactants and of phosphate buffer have been investigated with a view to the development of a method giving more reproducible results. A manometric method, based upon the evolution of CO_2 during the oxidation, has been devised which gives results in good agreement with more recent methods involving colorimetric determination of purpurogallin. It thus becomes possible to express the activity of peroxidase preparations in terms of Q_{CO_2}. The periodic fluctuations in apparent peroxidase activity of enzyme preparation, the origin of which still remains obscure, have been confirmed.

233I. The activation of urease.

HOFSTEE, B. H. *J. Gen. Physiol., 32,* 339-49 (1949).

Activity of twice crystallized urease is reversibly increased by moderate heating and reversibly decreased by storage in the cold, even in the frozen state. Crude extract of jack bean meal containing potent urease undergo the same changes in activity. Dilution has the same effect as moderate heating. Activity of material stored 24 hr. at —10° C. can be increased fivefold by heating for 5 min. at 60°C. An association between urease molecules or between urease and other proteins occurs which results in inactivation but which is reversed on dissociation.

234I. The degradation of potato starch by pancreatic amylase.

BLOM, J., AND SCHMITH, T. *Acta. Chem. Scand., I* (2), 230-2 (1947); *Biol. Abst., 22,* 2331, No. 23161 (1948).

While it was generally assumed that the fermentable sugar formed by the action of the pancreatic amylase on starch was maltose, the authors concluded from their work that considerable quantities of fermentable oligosaccharides were formed which had lower reducing power and higher specific rotation than maltose.

NUTRITION

235I. Vitamin C requirement of human adults. Vitamin C deprivation in man. Vitamin C Sub-Committee of Accessory Food Factors Committee, Medical Research Council, Preliminary Report.

LANCET, *254,* 853-8 (1948); *Brit. Abst. AIII,* 1173 (1948).

Nineteen men and one woman, aged 21-34, volunteered for the experiment. The food was selected and cooked so that the average intake was not more than 1 mg. of ascorbic acid daily. After a preliminary period of 6 weeks on a complete diet containing 70 mg. of vitamin C per day, ten of the volunteers received no supplement, seven received 10 mg. daily, and three received 70 mg. of C daily. The minimum protective dose is approximately 10 mg. per day. Thirty mg. per day is a safe daily intake.

236I. The value of urea in protein supplements for cattle and sheep.

DINNING, J. S., BRIGGS, H. M., AND GALLUP, W. D. *J. Animal Sci., 8,* 24-33, Feb., 1949.

Nitrogen retention by steers and lambs on each type of ration was increased by the additional nitrogen supplied by urea in the supplements. The 50% urea-nitrogen supplement was as efficient as the 25% supplement in promoting these retentions. There were feed refusals by steers, however, when the 50% supplement was fed in wintering rations. Lambs appeared to be more efficient than the steers in utilizing urea nitrogen. The apparent digestibility of ration nutrients other than protein (N X 6.25) was unaffected by urea. Feeding the 25% urea-nitrogen supplement at less frequent intervals, on alternate days as compared to daily and twice daily, had no effect on urea utilization by steers. No ammonia could be detected in the expired air of steers following the feeding of urea.

237I. The role of the time factor in feeding supplementary proteins.

GEIGER, E. *J. Nutrition, 36,* 813-19 (1948).

The problem of differential supplementation of proteins in young growing rats was investigated. Yeast, blood and wheat gluten do not promote growth when fed individually at a 90%

(Abstracts, continued on page 10 following technical papers)

INDUSTRIAL ENZYMES

Which of These Will Improve Your Products?

Enzyme System	Designation	Availability	Action on Substrate
Pectinolytic	PECTINOL	Commercial	Demethoxylates pectic substances and hydrolyzes them to galacturonic acid. pH range 3.5 - 5.
	Pectin esterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5 - 5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5. (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5 - 6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5 - 6.5.
Lipolytic	Lipase A	Experimental	Hydrolysis of fats to glycerin and fatty acids. pH range 5 - 7.
Lactase	Lactase A	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1 - 7.5.

Commercially available Rohm & Haas enzymes are being used *now* in the following industries:—Fruit juices, jellies and fruit juice concentrates, protein hydrolysates, baking, corn starch industries, fermentation. Have you stopped to think how these materials might improve your product or manufacturing process?

Start with your own natural products which contain pectins, proteins, cellulose, fat, starches or milk sugar. Consider the possibility of changing viscosity, texture, solubility, clarity or filterability of your product at any processing stage. Will the hydrolysis of one of these substrates permit better utilization of others?

Do you want a clearer product—one that filters or presses more readily? Will the end result of hydrolysis be a product that's better utilized, better tasting? Don't forget the possibility of recovering fiber, fat, sugar or protein in waste products.

Whenever you desire mild conditions of hydrolysis, or when you require flexibility in hydrolyzing only one of several components of a natural product, consider Rohm & Haas standardized enzymes. Write us about your problems and ideas. We'll be glad to send you our suggestions, samples, technical literature—or consult with you personally, all without obligation.

PECTINOL *and* RHOZYME *are trade-marks, Reg. U. S. Pat. Off. and in principal foreign countries.*

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News of the Institute

HONORS

NICHOLAS APPERT AWARD

Dr. Roy C. Newton of Chicago, Vice President of Swift and Company, in charge of research, was awarded the Nicholas Appert Medal by the Institute of Food Technologists at the Annual Convention in San Francisco, California, on July 12.

Dr. Newton is an outstanding scientist, administrator, and leader in research, particularly in the field of fats and oils. He is a past national president of the Institute of Food Technologists and is active not only in the Institute but also in the American Chemical Society, the Industrial Research Institute, the American Oil Chemists' Society, the George Washington Carver Foundation, the Nutrition Foundation, and the National Research Council.

STEPHEN M. BABCOCK AWARD

Clarence Birdseye of Gloucester, Mass., received on July 11, at the Annual Convention of I.F.T., the 1949 Stephen M. Babcock Award of the Institute. This award, made possible by an annual grant of one thousand dollars from the Nutrition Foundation, is given each year to some scientist who has made contributions to food technology that have passed into industrial use on a large scale and so have improved nutrition in the United States and Canada. Birdseye pioneered the quick freezing of seafoods, fruits, and vegetables.

NATIONAL LIVE STOCK AND MEAT BOARD AWARD

Dr. C. A. Elvehjem of the University of Wisconsin, whose achievements in the field of research have won for him national and international distinction, was signally honored at the recent annual meeting of the National Live Stock and Meat Board.

C. A. ELVEHJEM

He was presented an award which was in recognition of his contribution to the science of biochemistry and his leadership in the field of nutrition.

High tribute was paid to Dr. Elvehjem as a leader in research by Dr. Charles E. Friley, president of Iowa State College. Dr. Friley referred to him as truly a native son of Wisconsin, having not only been born in the state but having made a splendid record and built a fine career almost entirely within the confines of that state.

The speaker pointed out that the researches in nutrition which have been carried out by Elvehjem and his associates at the University of Wisconsin have become world famous, and that it would be impossible to even briefly digest the tremendous number of experiments, reports and accomplishments which have originated with Dr. Elvehjem and his group. He cited outstanding examples of success achieved through brilliantly planned research which has been a long step forward in the betterment of the public health.

The Board has placed several research grants at the University of Wisconsin in support of studies which have been carried on under the direction of Dr. Elvehjem. It was said that his findings have broadened the knowledge of the nutritive value of meat and have contributed immeasurably to the subject of nutrition.

Dr. Elvehjem was the recipient of the Nicholas Appert Medal in 1948.

FOOD INDUSTRIES AWARD

The Florida Citrus Canners Cooperative, Lake Wales, Fla., was presented on July 11 with the second biennial award of Food Industries magazine. In the 1949 competition, eleven processes in eight different fields of food technology were submitted for consideration to a jury composed of twenty-six I.F.T. members headed by Dr. Samuel C. Prescott, Dean Emeritus of Science at the Massachusetts Institute of Technology. The award was presented to the Florida Citrus Canners Cooperative for their frozen concentrated citrus juice process.

COMMITTEE ORGANIZATION

Institute of Food Technologists 1950 Conference

Chicago, Ill., Sunday, May 21 — Thursday, May 25, 1950

President of the Institute

National Publicity Committee

National Program Committee
Vice Chrm. L. A. Hall

Local Arrangements
All Local Matters
Genl. Chrm. C. L. Smith
Vice Chrm. R. A. Isker

Exhibits
Chairman L. E. Clifcorn
Solicit Exhibits
Assign Space
Supervise Exhibits

Local Publicity and Printing
Chairman M. E. Parker
All Printing—Program, Badges, Tickets, etc.
Local Publicity
Coop. with Natl. Pub.

Registration
Chairman R. D. Trelease
Advance and Current Registration
Distributing Tickets
Maintain Message Center

Budget and Finance
Chairman R. N. Schaffner
Prepare Budget
Establish Accounts
Supervise All Expense
Receive and Disburse Funds

Hotel Arrangements
Chairman E. S. Stateler
Reservations and Rooms
Banquets and Lunches
Meeting Rooms and Necessary Equipment

Entertainment
Chairman M. L. Laing
Vice Chairman D. A. Huber
Banquet and All Special Entertainment
Ladies' Entertainment

(News of the Institute continued on page 9 following technical papers)

Industrial and Legal Viewpoints

Functions of An Industrial Fisheries Laboratory

CHARLES H. SHACKELFORD

National Fish Department, The Great Atlantic & Pacific Tea Company, 151 Northern Avenue, Boston, Mass.

In this discussion of the functions of an industrial fisheries laboratory is information of interest to all food technologists concerned with quality control and research in food technology.

A typical industrial fisheries laboratory is not unlike the average research and control laboratory serving the vegetable, meat, dairy and other food industries. The fisheries laboratory has its bacteriological, chemical and physical testing sections and usually a modern well-equipped test kitchen. Among its activities are included (1) Establishment and maintenance of good sanitation in the processing and handling of fisheries products, (2) Quality Control and (3) Research and Development.

Sanitation is a responsibility of every individual employed by the industry. The laboratory, however, with its technically trained staff and facilities is able to approach the problems of sanitation scientifically. It is the responsibility of the laboratory to establish sanitary operating procedures and to insure their follow-through by means of frequent inspections. Sanitary procedures are far more effectively exercised if the person or persons responsible for a cleaning or sanitizing job realize the significance of such work. The laboratory can go far in the education of these persons to the prime necessity for good sanitation. Round-table discussions coupled with demonstrations will stimulate interest and give employees a new perspective in their work.

Quality control over fisheries products commences when the fish or shellfish are removed from their natural habitat and does not end until the finished product is finally consumed. A most important phase of quality control comprises the laboratory examination of the finished product. This examination normally includes (1) packaging efficiency, (2) weight control, (3) chemical and bacteriological analysis and (4) palatability testing. Analytical methods employed vary widely depending upon the nature of the product. There are no entirely satisfactory chemical or bacteriological tests for determining the quality of fresh and frozen fish fillets. The most satisfactory method available is organoleptic examination of the raw and the cooked fish. The examination is conducted by a taste panel composed of experts who have been chosen for their taste sensitivity and ability to reproduce results. Scoring or grading systems are based on arbitrary scales.

On the other hand, proper quality evaluation of certain other seafoods would be practically impossible without the aid of specialized chemical and bacteriological analytical methods. These foods include fresh and frozen oysters, soft shell clams, quahaugs, lobster meat, crabmeat and precooked frozen seafoods. Quality standards are established and maintained by the laboratory consistent with highest quality obtainable under practical efficient operation.

The industrial fisheries laboratory carries on very little research of a basic or fundamental nature. Such research is effectively conducted by colleges, universities and governmental agencies such as the United States Fish and Wildlife Service. The results of this basic research are made available to industry which, in turn, applies them to its every-day problems in sanitation, processing, packaging, etc.

A most vital and interesting problem in applied research currently under investigation by a number of fisheries laboratories is the application of antioxidants to fatty fish for the purpose of retarding the rancidity and browning which develop during storage of the frozen fillets. Research to date has established the effectiveness of such chemicals as Ascorbic Acid and NDGA as antioxidants for use on Mackerel and Salmon fillets. For these varieties shelf life extensions from 100 to 300% appear feasible depending upon type of antioxidant employed, concentration, mode of application, etc. Recent research has shown that certain water-soluble antioxidants such as Ascorbic Acid can be made more effective by incorporating a wetting agent in the dipping solution. The resulting reduced interfacial tension between the fat particles and the antioxidant solution presumably accounts for the increased efficiency. Oil soluble antioxidants such as NDGA heretofore only applicable in solutions of vegetable or mineral oils may be solubilized in aqueous solution by incorporation of a special type of wetting agent.

The fisheries laboratory research staff are constantly engaged in product improvement research and new product development. Here the technologist works closely with the merchandising, operating, production and cost departments until an original idea evolves itself into a new product or an improvement in an existing one. New products often require specialized processing techniques, different types of packaging, a different method of handling. These are a few of the problems that confront the laboratory research staff.

Fresh crabmeat is a fine example of a laboratory quality-controlled commodity. The crabmeat industry referred to is not the small local crab industry of New England but rather the commercially significant industry of Southern Atlantic waters centered in Maryland and Virginia on the Chesapeake Bay and in smaller bays and inlets along the Carolina and Georgia coasts. The commercial crab of these waters is the Blue Crab *(Calinectes sapidus)*. The industry is by and large seasonal, commencing in May and continuing through the summer and on into September. The majority of crab

plants are also oyster shucking plants handling oysters during the cold winter months and changing over to crabmeat packing during the summer. The State of Maryland is unique in having a conservation law prohibiting the taking of Blue Crabs during the winter months. Such far-sighted measures have proven effective in maintaining a continuing supply of crabs in heavily fished areas in the heart of the industry. Other states will undoubtedly follow Maryland's fine example and establish certain closed seasons for the protection of this delectable seafood.

For those readers who are not familiar with the methods of taking, handling and processing of crabs for the market, a brief resumé is in order. The principal method of fishing crabs during summer months is by the "trot-line." In brief, this consists of a line 1,000 ft. or more in length baited at intervals of about 5 feet with tripe, eels, etc. During winter months when crabs lie inactive on the bottom they are not attracted by bait and consequently must be caught through the use of a dredge. The crabs are kept alive by the fisherman until delivered to the crab plant. Here they are cooked by means of either boiling water or steam under pressure, the latter method predominating in the industry today. The cooked crabs are transferred to sanitary cooling platforms for air cooling and thence to the picking rooms. Here the meat is removed from the shell by deft workers who segregate it according to grade (regular, claw or backfin) as it is removed and packed directly into 8 oz. and 1 lb. tins. The packed tins are thence packed in crushed or flake ice in barrels in preparation for shipment to distribution centers.

The visual quality of crabmeat depends a good deal upon the individual skill and fastidiousness of the picker. An overabundance of shell and mashed or broken pieces of meat reduce the quality of the crabmeat and are the result of unskilled or careless workmanship on the part of the picker.

The bacteriological picture, however, is of the greatest importance in evaluating the quality of crabmeat. If the initial bacterial load is excessively high, crabmeat of excellent appearance, flavor and odor may be predestined to spoil and become putrid in as short a time as a day or two after packing even under favorable storage conditions at 32 to 40° F. Crabmeat spoilage is of public health significance and of great economic importance by virtue of losses incurred in this costly commodity. Also of great public health significance is the contamination of the meat with fecal matter. Evidence of pollution in crabmeat can usually be traced directly to cases of lax personal cleanliness and improper supervision. The necessity for ample sanitary measures in the industry is particularly obvious when one considers that crabmeat is a fresh, highly-perishable commodity ready for consumption as packaged without benefit of further heat processing or sterilizing treatment.

The majority of crab plants are relatively small, some producing as little as a few thousand pounds of meat in a season, and for this reason large companies handling hundreds of thousands of pounds yearly must depend upon many of these small packers to satisfy their requirements.

Laboratory control commences at the point of production. Extensive sanitary inspections are conducted periodically by a member of the laboratory staff. The individual packers are instructed in latest sanitary operating procedures and in sanitary plant construction. Such contacts serve to screen out poor packers who are either unable or unwilling to produce a product consistent with a packer's quality standards.

The next and all-important phase of the laboratory control is the actual analysis of finished products. The analysis consists of (1) Check-weighing for compliance with minimum weight standards, (2) pH determination, (3) Nessler's reaction, (4) E. coli incidence, (5) Total bacteria count and (6) Organoleptic examination for appearance, texture, flavor and odor. From time to time additional analytical methods are employed, as for example, (1) determination of pieces of shell per unit weight and (2) determination of percent total solids. The latter test is employed if it is felt that a particular packer is excessively washing his crabmeat. Cooked crabmeat will absorb considerable quantities of fresh water or light brine on prolonged contact with a resultant decrease in percent total solids.

A total bacteria count by itself is not necessarily indicative of poor sanitation at point of production, neither is it always indicative of incipient spoilage. It may indicate either one or a combination of both of these factors. For instance, perfectly fresh crabmeat at point of production may have a terrific bacterial load due wholly to unsanitary conditions causing contamination of the meat. Conversely, meat prepared under ideal sanitary conditions with a low initial bacterial load may result in excessively high bacteria count in a day or two as the result of improper refrigeration. Accordingly, an intelligent appraisal of the quality and sanitary history of any given lot of crabmeat can be attained only by integration of all analytical data. The pH of the crabmeat is of some significance and rises proportionately with an increase in ammonia and amine bases resulting from the proteolytic action of bacteria. The Nessler's reaction is also indicative of ammonia and amine bases and is perhaps of more significance than pH since the correlation is not influenced so much by buffering action of free acids formed during decomposition. High pH and Nessler's reaction coupled with high bacteria count generally indicate incipient spoilage whereas low pH and Nessler's reaction coupled with high bacteria count are generally indicative of excessive bacterial contamination during processing or handling as the result of poor sanitation.

Presence of E. coli in crabmeat indicates fecal contamination. Its incidence serves as a measure of employee personal cleanliness and also effectiveness of vermin and insect control.

It has been the intent of this paper to familiarize food technologists with the general workings of a typical industrial fisheries laboratory and to show him how the laboratory organization works with management in the interests of better quality seafoods.

News of the Institute

(Continued from page 6 preceding technical papers)

Transportation and Field Trips
Chairman V. O. Wodicka
All Field Trips
Special Local Transportation
Transportation to Chicago

Courtesy
Chairman W. D. Shannon
General Information Service
Monitor Service
Special Guests
Special Duties

GEOGRAPHICAL DISTRIBUTION OF MEMBERSHIP

A compilation, as of June 24, 1949, by Secretary Fellers, gives the following interesting information in regard to the geographical distribution of membership in the Institute of Food Technologists:

Maine	13	Minnesota	50
New Hampshire	1	Iowa	27
Vermont	5	Missouri	55
Massachusetts	160	North Dakota	0
Rhode Island	6	South Dakota	0
Connecticut	18	Nebraska	10
New England	203	Kansas	10
		West No. Central	152
New York	388	Arkansas	5
New Jersey	231	Louisiana	9
Pennsylvania	131	Oklahoma	0
Middle Atlantic	750	Texas	22
		West So. Central	36
Delaware	9	Montana	2
Maryland	90	Idaho	2
Dist. of Columbia	22	Wyoming	0
Virginia	13	Colorado	8
West Virginia	2	New Mexico	2
North Carolina	6	Arizona	1
South Carolina	5	Utah	4
Georgia	23	Nevada	0
Florida	59	Mountain	19
South Atlantic	229		
		Washington	74
Ohio	76	Oregon	56
Indiana	32	California	490
Illinois	429	Pacific	620
Michigan	70		
Wisconsin	61	Hawaii	6
East No. Central	668	Alaska	1
		United States Total	2,707
Kentucky	7	Mexico	6
Tennessee	9	Canada	83
Alabama	3	Other countries	77
Mississippi	4	Outside U. S.	166
East So. Central	23	Grand Total	2,873

Regional Section News

NORTHERN CALIFORNIA SECTION

At a meeting of the Executive Committee on May 19, it was announced that E. A. Seipp of Golden State Co. and a former member of the Chicago Section of I. F. T. has become a member of the Northern California Section. In addition, the following applications for membership were approved:

R. D. Armstrong, The Welch Grape Juice Co.
Henry Ball, F. M. Ball & Co.
T. D. Barlow, The Barlow Co.
H. M. Buley, S & W Fine Foods, Inc.
B. J. Butler, Atlas Pacific Eng. Co.
Alice R. Collings, Western Regional Research Laboratory
J. C. Connell, American Can Co.
Dave Eolkin, Gerber Products Co.
E. W. Flavell, Holly Sugar Corp.
L. F. Jents, Doughnut Corp. of America
A. A. Klose, Western Regional Research Laboratory
T. M. Lukes, Student
R. D. Mathews, S & W Fine Foods, Inc.
B. E. Monroe, Standard Brands, Inc.
J. J. O'Connell, Silveira & O'Connell
C. F. Pinney, Langendorf United Bakeries, Inc.

On June 23, a Section meeting was held to acquaint the membership with the accomplishments and objectives of the various committees of the 1949 National Convention. At this meeting the following applications for membership in the Section were approved:

John M. Leavitt, James Q. Leavitt Co., Oakland
Gault Davis, International Minerals & Chemical Corp.
Luis de Alcuaz, Gerber Products Co., Oakland
Edwin S. Doyle, N. C. A., Western Branch Lab., San Francisco
Milton P. Duffy, Bureau Food and Drug Inspection, State of California
James F. Duncan, Golden State Co., Ltd., San Francisco
Frederick G. Eis, Spreckels Sugar Co., Woodland, Calif.
James W. Joyce, Workman Packing Co., San Francisco
Hugh C. Landes, San Francisco
F. E. Lindquist, Western Regional Research Lab., Albany, Calif.
Benjamin Makower, Western Regional Research Lab., Albany, Calif.
Irwin Martin, Wm. J. Stange Co., Oakland
George E. Mauer, Chas. Pfizer & Co., Inc., San Francisco
Herman J. Morris, Western Regional Research Lab., Albany, Calif.
Louis J. Nava, Golden State Co., Ltd., San Francisco
Joy S. Neidlinger, Golden State Co., Ltd., San Francisco
Henry Louis Roux, Marlboro Beverage Co., San Francisco
Doris M. Tilden, Federal Food and Drug Adm., San Francisco
Graham Vernig, John Bean-Food Machinery and Chem., San Jose

Lyman M. Cash, formerly chemist of the Italian Swiss Colony, is now working for Gallo Winery.

R. O. Thompson, formerly with Goble Disc Works of Fowler, has joined the Pacific Olive Co. of Visalia as a partner. Other partners who retain a majority ownership and an active interest in the Company are Edward Van Dellen and Richard N. Ball.

SOUTHERN CALIFORNIA SECTION

Dr. Philip K. Bates, formerly Director of Rexall's Product Development Department, has been elected President of the Cabot Chemical Company, a newly formed, independent subsidiary of Rexall Drug, Inc. The new company will have its own research, sales, and merchandising operations and will be responsible for the development of ethical pharmaceutical specialties. The offices will be in Los Angeles.

ST. LOUIS SECTION

On May 25, the St. Louis Section elected the following officers for 1949-50:

Chairman: Frederick A. Linde, Monsanto Chemical Co., 1700 South Second St., St. Louis 4, Mo.
Vice-Chairman: J. M. Blatterman, Warner Jenkinson Mfg. Co., 2526 Baldwin, St. Louis 3, Mo.
Secretary-Treasurer: Bonnie Britt, Ralston Purina Co., 835 South 8th St., St. Louis 2, Mo.
Councilor: Eugene V. Nay, St. Louis Brewer's Yeast Corp., 1514 North 13th St., St. Louis 6, Mo.

Executive Committee: Addison Y. Finkelnburg, Blanke-Baer Extract & Preserving Co., 3224 South Kingshighway, St. Louis, Mo.; Henry Peplies, Griesedieck Western Brewing Co., 1201 W. East St., Belleville, Ill.; Ulysses C. Gramsch, Falstaff Brewing Co., 3617 Olive St., St. Louis 8, Mo.; Nicholas Ferraez, Jr., St. Louis Dairy, 2001 Chestnut St., St. Louis 3, Mo.; Alexander F. Bucholtz (ex officio), Sicks' Brewing & Malting Co., 3100 Airport Way, Seattle 4, Washington.

NEW YORK SECTION

On May 25, officers of the New York Section for the coming year were elected as follows:

Chairman: Ira D. Garard, Department of Chemistry, New Jersey College for Women, New Brunswick, N. J.
Vice-Chairman: Stephen L. Galvin, The Huron Milling Co., New York 7, N. Y.
Secretary: Albert A. Schaal, Good Housekeeping Bureau, New York, N. Y.
Treasurer: Philip Kraatz, Hoffman Beverages.

GREAT LAKES SECTION

C. Olin Ball, Editor of FOOD TECHNOLOGY, left Ohio in July to do research work in food technology at Rutgers University and to carry on his outside consulting work simultaneously. He plans to operate his laboratory in New Brunswick, N. J., under the name of "Food and Container Research Laboratories."

MARYLAND SECTION

The Maryland Section held the final meeting of the season on June 10, in Baltimore. Following the dinner and business meeting, Dr. John C. Krantz of the University of Maryland Medical School, Baltimore, spoke on "If Sugar Burns, or the Metabolism of Carbohydrates."

PUGET SOUND SECTION

At the Annual Meeting of the Puget Sound Section in Seattle, Washington, on May 26, Dr. Edward Ross, Associate Professor of Horticulture at Washington State College, Pullman, Washington, spoke on "The Uses of High Frequency Radio Power in Food Processing."

Officers for the coming year were elected as follows:

Chairman: Howard C. Douglas, University of Washington, Seattle 5, Washington.
Vice-Chairman: James C. Palmer, U. S. Food and Drug Administration, 501 Federal Office Bldg., Seattle, Washington.
Secretary: Max Patashnik, Libby, McNeill & Libby, Seattle 4, Washington.
Treasurer: Arthur J. King, Fisher Flouring Mills Co., Seattle 4, Washington.
National Councilor: William L. Haley, Fisher Flouring Mills Co., Seattle 4, Washington.
Executive Committee for 2 years: Clarence W. Hurlbut, Blue Banner Foods, Kent, Washington.
Executive Committee for 1 year: Robert L. McDonald, Frozen Food Division, Deming and Gould Co., Seattle 1, Washington; Francis P. Owens, Laucks Laboratories, Inc., Seattle 4, Washington.

Clarence L. Anderson, Chairman of the Puget Sound Section during the past year, has resigned his position as Assistant Director of the State of Washington Department of Fisheries. On June 1, he became Director of the Department of Fisheries for the Territory of Alaska, with headquarters in Juneau.

CHICAGO SECTION

The June issue of *The Vitalizer* is dedicated to the hosts of the Ninth Annual I. F. T. Conference, the Northern California Section, and contains some interesting historical notes on the Northern California Section by W. V. Cruess.

M. C. Phillips, Vice President of The Griffith Laboratories, Inc., has recently become a member of I. F. T. He is a charter member of the American Society of Bakery Engineers and one of eight charter members who have maintained a perfect attendance record at the annual meetings for the 25 years since the organization was established.

Abstracts

(Continued from page 4 preceding technical papers)

protein level. Diets containing wheat gluten plus blood protein, or yeast plus blood protein, or yeast plus wheat gluten protein have satisfactory growth promoting qualities. If however, these same pairs of proteins are fed separately with lapses of time between feedings, they do not supplement each other, as is indicated by the lack of resulting growth.

238I. Effect of industrial heat treatment on the protein values of foods.

JACQUOT, R., MATET, J., AND FRIDENSON, O. *Ann. Nutrit. Alimentation*, 1,157-213 (1947). *Nutr. Abst. Rev. 18*, 35 (1948).

The effect of different types of heat treatment, e.g., autoclaving, high-temperature extraction, and dry heat, on foods is summarized. The results described are very variable. The effects on milk and milk products, cereals, peas, lentils, and cottonseed are in general unfavorable; biological value and in some cases digestibility is reduced. The effect on haricot and soya beans, on the other hand, is favorable, increasing the biological value, i.e. the available amino acids. In other materials, such as copra, sunflower seed, groundnuts, the effect is indefinite. In general, dry heat is the most harmful type of treatment; moist heat, e.g., autoclaving, often increases the biological value of food protein. An extensive bibliography is given.

239I. A synthetic milk ration for baby pigs.

LEHRER, W. P., JR. et al. *J. Animal Sci., 8*, 107-11, Feb. 1949.

Using growth and urinary B-vitamin excretion as criteria of adequacy, a synthetic milk for baby pigs was devised. The diet consisting of casein, cerelose, lard, mineral salts, supplemented with thiamine, riboflavin, nicotinic acid, inositol, choline, pyridoxine, calcium pantothenate, vitamin E, vitamins K, A, and B.

240I. The influence of soybean oil meal upon roughage digestion in cattle.

BURROUGHS, W., AND GERLAUGH, P. *J. Animal Sci., 8*, 3-7, Feb., 1949.

The dry matter digestion in corncobs and timothy hay was increased by 14% and 17% respectively, by the inclusion of soybean oil meal in the ration. These differences are of practical significance. In the case of corncobs, the beneficial influence of soybean oil meal was not sufficiently great to fully explain the divergent feedlot results on the value of cobs obtained by different investigators. It is possible that factors other than protein may have been responsible for the favorable influence of soybean oil meal upon corncob and timothy hay dry matter digestion.

FOOD PRODUCTS

CEREALS, GRAINS, AND FERMENTATION PRODUCTS

241I. Modern concepts of flour mill sanitation.

BUCKLEY, M. S. *Northw. Miller Milling Prod. Sect., 238,* 1a, April 12, 1949.

Plans given for thorough inspection. Selection of the proper formulation of insecticide in food plants should be based on (1) If the area to be sprayed is a non-porous surface like glass, metal, enameled surfaces, etc., an oil base spray may be used to a good advantage. (2) If the surface to be treated is porous, such as concrete, untreated wood or flat painted surfaces upon which water staining is not objectionable, then the water emulsion is the proper formulation to use. (3) If the surfaces are porous and the presence of a chalky residue is not objectionable, then the wettable powder may be used to a good advantage.

242I. Method of preparing an adhesive from cereal flour.

KESLER, C. C., AND HICKS, W. L. Assignors to Penick and Ford, Ltd., Inc. 2,466,172, April 5, 1949.

A method of preparing an adhesive from cereal flour, comprising mixing the cereal flour in water with an alkali to bring the pH to about 9-10, heating the material at a temperature about 130° F. to inactivate the naturally occurring enzymes in the flour, raising the temperature to about 170-210° F. to cook the starch, and adjusting the pH of the material within 5-7.

243I. Grain alcohol fermentations. Submerged mold amylase as a saccharifying agent.

LEMENSE, E. H. et al. *Ind. Eng. Chem., 41,* 100-3 (1949).

Experiments were conducted on a pilot plant scale by utilizing conventional distillery equipment and were designed to supply data on the following points: type and concentration of enzymes produced in submerged fermentation under varying rates of aeration, concentration and quantity of mold culture required to replace malt; alcohol yields obtainable by the continuous use of fungal amylase for the saccharification and fermentation of corn; and investment and operating costs for the production of fungal enzymes by the submerged process. Results showed that saccharification was satisfactory and alcohol yields were comparable to those obtained with malt when mold culture liquor equivalent to 6 to 10% of the final volume was used. The cost of the amylase is estimated to be 6.06 cents per bushel of grain processed, as compared with 12.1 cents in the case of malt.

244I. Gin flavorings.

JACOBS, M. B. *Am. Perf. 53,* 54-6, Jan., 1949.

American gin flavor is based chiefly on juniper and angelica; British gin flavor on juniper and coriander. Holland gin retains some of the grain flavor in the alcohol base; juniper is added. Gin is usually bottled as made, without aging.

COCOA PRODUCTS

245I. Cocoa seen as new field for soy.

BENNING, W. *Soybean Dig., 9,* 38, Jan., 1949.

Ground cocoa, deprived of its oil content, is mixed with a far greater percentage of ground soybean. With water added, it produced a drink like that of cocoa mixed with milk. It is found to be very nourishing and satisfying. The value of soy in cocoa lies in its high albumen content. Cocoa itself is deficient in albumen. The purpose of the soy is not to crowd out the milk chocolate but to furnish a very nourishing addition.

DEHYDRATED FOODS

246I. Method of dehydrating food products.

KELLOGG, J. L. Assignor to J. L. Kellogg & Co. 2,467,318. April 12, 1949.

The method of dehydrating organic cellular material which includes the steps of freezing the material so as to freeze the water content thereof and thereby expand the cellular structure of the material, and thereafter reducing the material to small particles and feeding them at a uniform rate into an air stream heated to approximately 350° F. wherein the frozen water content is quickly vaporized, while the material is in suspension and before the frozen water returns to the liquid phase, whereby the presence of ice crystals in the material together with the additional cooling effect due to quick evaporation, maintains the material relatively cool.

247I. The bacteriology of dehydrated vegetables.

RISHBETH, J. *J. Hyg., 45,* 33-45 (1947); *Nutr. Abst. Rev. 18,* 42 (1948).

An investigation into the causes and sources of bacterial contamination of cabbage, potato and carrot during commercial dehydration showed that the microflora was very varied, but potential pathogens other than *Bact. coli* were seldom encountered. Practical freedom from bacterial infection resulted from scalding, but subsequent passage over conveyors and exposed equipment greatly increased bacterial contamination. The final drying process caused some reduction of bacteria, except where uneven drying of cabbage resulted in bacterial multiplication. On storage bacteria normally died out, particularly at the higher temperature tested, and no growth of bacteria took place if the moisture content did not exceed 5% for cabbage and carrot and 8% for potato. Normal rehydration and cooking by the consumer destroy most of the bacteria, but prolonged soaking may result in souring.

The number of bacteria found in the products of different factories was largely influenced by their equipment. Suggestions are made for improvement in the design of factory dehydration plant.

In an attempt to evaluate the accuracy and reliability of the plate count technique it was found that considerable errors arose from the probably irregular distribution of bacteria throughout the bulk of the material examined and from imperfect distribution of bacteria in suspensions. Bacteria appeared to exist on the surface of vegetables only. Plate counts tended to be greater when suspensions were prepared at higher temperatures over the range 10° to 40° C. It was concluded that the plate count could be used with some confidence as a general guide to the state of factory hygiene.

248I. The effect of storage on the reducing power of dried potato products.

KRONER, W. *Vitamine u. Hormone, 4,* 173-81 (1943); *Nutr. Abst. Rev. 18,* 114 (1948).

The ascorbic acid content was estimated by indophenol titration in dried potato slices of 3 different varieties from 4 factories, in potato flakes, and in roller-dried potato powder. During about 6 months' storage at room temperature there was little loss of ascorbic acid from slices or powder, by the end of 8 to 10 months losses up to 50 percent of the original content were observed. The values for different varieties varied in different years and the stability of the vitamin appeared to vary also in different samples of the same variety. The loss from potato flakes was more marked than from other products. This was not serious from the point of view of human nutrition since flakes were usually given to animals which would obtain vitamin C from other sources. Storage at higher temperatures up to 32° C., caused a more rapid loss of vitamin C from potato products. In some samples, the apparent reducing value increased after prolonged storage at 32° C.

FATS AND OILS

249I. The keeping quality of elaidinated fats.

BERTRAM, S. H. *J. Am. Oil Chem. Soc., 26,* 83-5 (1949).

The causes of the considerably better keeping quality of elaidinated oils and fats have been investigated through the rate of peroxide formation. They are physical as well as chemical in nature. The more solid composition of elaidinated fats is the physical cause. Traces of selenium have been proved to behave as a strong antioxidation agent. The elimination of traces of metals in the course of the process of elaidination with Se also has a very favorable influence. The elaido configuration of the unsaturated acids, however, has been shown to be the principal factor in retarding oxidation.

250I. Phospholipoid carrier for antioxidant.

HALL, L. A. Assignor to the Griffith Laboratories, Inc. 2,464,928, Mar. 22, 1949.

The method of incorporating a normally substantially fat-insoluble gallic acid ester in a fatty material comprising the step of dissolving the ester in a relatively large proportion of molten lecithin and then introducing the molten solution to the fatty composition likewise in a molten state, and thoroughly mixing the materials.

251I. Antioxidant.

HALL, L. A., AND GERSHBEIN, L. L. Assignors to the Griffith Laboratories, Inc. 2,464,927, Mar. 22, 1949.

An antioxidant composition for fatty materials comprising a vegetable carrier oil and a synergistic mixture of a tocopherol, a low molecular weight alkyl ester of gallic acid, and lecithin.

FRUIT

252I. Fruit peeling and coring machine.

GROSS, A. C. 2,465,223, Mar. 22, 1949.

A machine for removing rinds from fruit comprising a frame, a driven rotary cutter supported by the frame, pairs of reciprocating hooks carried by the frame, spindles for insertion through the fruit and supported at their ends by the pairs of hooks, and means actuating the pairs of hooks for positioning the fruit against the driven rotary cutter.

253I. Machine for removing meat from shells.

SCHOENING, O. A. Assignor to Hawaiian Pineapple Co., Lt. 2,467,158, April 12, 1949.

An eradicator machine for removing a relatively soft layer of meat from a hard, tough, flexible shell comprising a conveyor having shell gripping means on a face thereof, a knife having a cutting edge extending transversely of the path of travel of the conveyor adjacent the shell gripping face thereof for severing meat from the shells carried by the conveyor, a grid disposed opposite the shell gripping face of the conveyor immediately in advance of knife and including a plurality of grid bars spaced laterally and extending longitudinally of the path of the conveyor and projecting toward the conveyor to penetrate the meat layer of the shells carried by the conveyor, means resiliently mounting the portion of grid adjacent said knife for yielding away from the conveyor under predetermined pressure of a shell on said grid bars, and means connecting knife to resiliently mounted grid portion for movement of the cutting edge of the knife toward and away from the conveyor in conformity with the movement of grid portion.

MEAT AND POULTRY

254I. Odor and taste tests of pork from animals sprayed with benzene hexachloride.

LEHRER, W. P., JR., BARR, W. F., AND MANIS, H. C. *J. Animal Sci., 18,* 141-3, Feb., 1949.

The majority of the testers considered the samples pleasing in taste and odor throughout the test period. This indicates that there is no off odor or taste in the meat of swine treated with benzene hexachloride for the control of mange or lice, when a water suspension spray is used two or more weeks before slaughter. Some individuals reported questionable odors and off flavors; however, this can be attributed to the variations in the taste of individuals and the fact that the meat samples were unseasoned. Since completion of this experiment, Grummer, Bray and Bohstedt (1948) have reported that pork from recently sprayed animals had "off" taste and odor.

255I. Four methods of defrosting poultry studied.

BEERY, I., PRUDENT, I., AND WILSON, E. D. *J. Home Econ., 41,* 203-4 (1949).

Methods used were: (1) standing loosely covered with wax paper in the refrigerator at 40° F. for approximately 20 hours or until an internal temperature of 4° C. was reached; (2) standing loosely covered at room temperature, 77° F. to 88° F., for about four hours or until an internal temperature of 4° C. was registered; (3) standing in warm water at 49° C., the volume of water being four times the weight of the frozen roaster, until the same internal temperature of 4° C. was obtained; (4) placed immediately in the roasting pan in an oven at 350° F. The choice of one of these methods of defrosting has little or no effect on the palatability factors of frozen roasters except for tenderness, and it makes little or no difference as far as cooking losses are concerned.

PECTIN—JAMS AND JELLIES

256I. The use of pectin hydrolysis in the processing of milk and whey.

MAASS, H. *Milchwissenschaft, 2,* 286-8 (1947). English, French and Russian summaries. *Nutr. Abstr. Rev. Vol. 18,* 37 (1948).

Attention is drawn to the fact that when sol. casein in milk or whey, or whey albumin, is in contact with calcium pectate, which is then submitted to the action of pectase, the pectate loses its effect as a protective colloid, and the protein is pptd. This is the basis of the effectiveness as protein precipitants of certain plant juices rich in pectase.

257I. Edible gelling composition containing Irish Moss extract, locust bean gum, and an edible salt.

BAKER, G. L. Assignor to Krim-Ko Corp. 2,466,145, April 5, 1949.

A composition containing in approximate proportion by weight of Irish Moss extract 50%, locust bean gum 33⅓%, and potassium chloride 16⅔%, said composition being capable of forming a strong and elastic gel solely by applying water and heat thereto sufficient to dissolve and disperse the ingredients and then cooling the same to gelling temperature, the gel product having strength and elasticity of greater magnitude than can be accounted for by the additive effects of the locust bean gum and the potassium chloride on the Irish Moss extract.

Book Review

INTRODUCTORY FOODS, by Osee Hughes, Ohio State University. The Macmillan Company, New York, N. Y., 1949. 575 pages. Price $4.25.

This is a revised edition of a book first published in 1940. As in the first edition the subject matter has been adjusted to the following present-day trends in the teaching of introductory food courses: (1) "Courses are being offered somewhat earlier than formerly (either in the Freshman year or early in the Sophomore year); (2) courses include little or no experimental work; (3) considerable use is being made of the demonstration method partly to replace experiments, partly as a time and energy saver in presenting fundamentals, and partly for the purpose of developing better food standards in students."

The sequence of chapters has been changed somewhat but, as the author states, there are so many ways of teaching foods that it is impossible to suggest a sequence suitable for all uses. The chapter on frosted foods has been brought forward for more convenient use in relation to the cookery of frozen fruits, vegetables and meats. The chapter on food preservation, which includes canning, freezing, drying, jelly-making and pickling, has been greatly enlarged. The number of illustrations has been increased with the idea of not only improving preparation procedures but also of developing higher standards for the finished products. More basic and type recipes have been included.

This edition like the first one is well organized and clearly written. It is interesting reading and has proved its worth as a text for introductory food courses during the nine years elapsing since the first edition.

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News of the Institute

COLONEL CHARLES S. LAWRENCE NEW I. F. T. SECRETARY

The rapidly growing family of FOOD TECHNOLOGY readers will be pleased to learn that Colonel Charles S. Lawrence, who will retire from the United States Army on September 30, 1949, has been appointed Executive Secretary of the Institute of Food Technologists and Business Manager of FOOD TECHNOLOGY. Colonel Lawrence will take office October 1 and will be located at 222 West Adams Street, Chicago, National Headquarters of I .F. T.

Colonel Lawrence is well known throughout the food and container industries, and his versatile talents have brought him into contact with the technical and managerial staffs of many other industries as well. Among these are equipment industries that supply the operational needs of the Armed Forces. He has long been familiar with materials handling equipment and in his present military position, President of the Quartermaster Board, has been responsible for many of the proving tests run on trucking and loading devices as well as on other types of Quartermaster Corps equipment and supplies.

Prior to his appointment to the presidency of the Quartermaster Board, Colonel Lawrence was Commanding Officer of the Quartermaster Food and Container Institute. In this capacity he worked closely with industrial firms and their staffs, with research groups from university, government, and other laboratories, and with representatives of military agencies concerned with food or the packaging and packing of food items.

Conceiving the need for a means whereby it would be easier for diverse groups to understand the food needs of the Armed Forces and to cooperate in solving the food and container problems of the Armed Forces, Colonel Lawrence was active in the founding of the Associates, Food and Container Institute. This organization, he felt, would provide a common meeting ground for military, industrial, and institutional people interested in research and development work relating to foods and their containers. From this group there is now forthcoming much sound counsel which already is being reflected in more satisfactory specifications for the procurement of foods and containers for military use.

Colonel Lawrence will have come to his I. F. T. office over a hard trail. He is thoroughly familiar with the rigors of war, having served in the Mexican Border campaign and both World Wars. He was at Bataan, experienced the Death March, and was a war prisoner of the Japanese until August, 1945.

During his enforced sojourn at Chen Chi Tun on the rim of the Gobi Desert, he obtained some unwelcome data on quick-freezing—in relation to human subjects. The temperatures in winter ranged from 50° to 60° below zero in that bleak outpost. He also learned at first hand the long-term effects of a low calorie diet.

Numerous additional experiential and educational qualifications of the new I. F. T. secretary for the discharge of the duties of his post should be mentioned. In

(News of the Institute continued on page 8 following technical papers)

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

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TECHNOLOGY IN UNITED STATES

BARRON'S in its weekly discussion "How's Business," recently credited "venture capital" for technology with responsibility for the high level of American living standards. The following paragraphs are quoted.

There are apparently just two important roads to obtaining above average prices. One is monopoly, the other innovation. Only the latter works forever. Synthetic rubber illustrates the clash between the two. Malayan and Indonesian planters monopolistically kept up the price of rubber in the years between world wars, and thereby enjoyed big profits without working very hard. Stewart Alsop, writing from Malaya, recently reported what the rest of the story is likely to be:

"'Pretty soon now,' an American rubber buyer remarked to this reporter, with that happy reverence for American technical proficiency which is almost an American religion, 'we'll be making synthetic at a price the natural plants can't possibly meet.' He stopped smiling. 'Then I guess I'll be out of a job.'"

The sad plight of the Malayan rubber planters still does not adequately explain why American business men have followed such a very different course. Anti-monopoly laws deserve part of the credit. But some startling and highly important innovations have come from the plants and laboratories of the American Telephone & Telegraph Co., which is virtually a monopoly. Today it takes less than three minutes to put a call through from New York to Chicago or Miami. A new long-distance dial system is the secret. But behind that secret lies another—intense competition within American Telephone, fertilized by a management technique which inflexibly forbids internal politics.

The profit motive is a nice phrase, and a significant one. Business men certainly do things because they seek profits. But that is true of British or Malayan or Hindu business men as well as Americans; the profit motive does not explain the essential difference.

"Venture capital" is another newly coined and attractive phrase. Without a doubt, during the nineteenth century and the early part of the twentieth century it was venture capital, provided almost entirely by rich men, which gave new inventions and development programs the seed money that enabled them to get started and eventually to prosper. A great deal has been written recently about scarcity of venture capital, and dire effects have been predicted. But the facts seem to belie the predictions. Television found its venture capital, even in the face of the fact that television broadcasting is still generally unprofitable, and so did many new postwar developments in the fields of electronics, plastics, aeronautics and what not.

This venture capital was found mostly in the treasuries of corporations. The essential factor which today probably has more to do with the rising American scale of living than any other is, in economists' jargon, the extremely low liquidity-preference-quotient of top management groups of American corporations. Would General Motors exchange a spender like Kettering for an expert on interest rates?

Our government, too, has contributed to the rate of capital formation more than its mere policing of the anti-trust laws. Early subsidies enabled both the railroads and airlines to get on their feet. The building of roads made the automobile age possible. The arrival of synthetic rubber was speeded by government wartime action.

But government subsidies are not particularly American. Nor can the American government be given credit for our high standards of food, clothing, transportation, or (the new law notwithstanding) housing. These blessings really stem from the utter disregard of financial problems evidenced by American business men.

Even bankruptcy deters them hardly at all. Notice what happens to the equipment of a railroad after it is declared insolvent. Compare the cars and comforts of the New Haven during the period of its receivership with those of its still solvent neighbors, the Central and Pennsy. Even Robert R. Young cannot do as much to spruce up the appearence of a railroad as a court reorganization.

The American economy will continue its brilliant rate of progress as long as our corporations are not too much restricted as to size, as long as technical proficiency is admired and as long as a low preference for liquidity is the road to individual success.

Selected Abstracts

ANALYTICAL METHODS

258I. Sodium and potassium in foods and waters. Determination by the flame photometer.

BILLS, C. E. et al. *J. Am. Dict. Assn., 25,* 304-14 (1949).

Sodium and potassium determination on about 500 foods and 150 public water supplies are presented. A discussion of the occurrence of sodium in foods and waters is given, together with incidental comparisons of analytical methods.

259I. Separation and estimation of saturated C_2-C_5 fatty acids by buffered partition columns.

MOYLE, V., et al. *Biochem. J., 43,* 308-17 (1948).

A new method is described for the identification, separation, and estimation of most of the steam-volatile members of the saturated series of fatty acids. The procedure is based on the principle of partition chromatography: heavily buffered silica gels, without indicator, form the stationary phase of the partition columns, the moving phase consisting of mixture of chloroform and butanol. Naturally occurring fatty acids from acetic to caprylic can be identified, quantitatively, separated, and estimated. Caprylic cannot, however, be separated from higher acids. Of the non-natural acids, oenanthic can be separated from lower but not from higher acids. Partial separation has been achieved between isomeric forms of valeric acid, but isomeric acids cannot, in general, be distinguished or separated. Acids can be recovered from the columns in quantities large enough to permit the preparation of characteristic derivatives. Optimal results are obtained with quantities of the order of 0.1 mmol. of each acid, whether taken separately or in mixture.

BIOLOGICAL SCIENCES

MICROBIOLOGY

260I. Effect of flesh acidity on bacterial numbers and trimethylamine in spoiling fish.

FARR, H. L. A., AND NEY, P. W. *Fish. Res. Bd., Canada, Pac. 78,* 11-13, Apr., 1949.

The amount of trimethylamine present is not a very sensitive measurement for bacterial spoilage.

261I. Longevity of the coliform bacteria and enterococci in iced crabmeat.

McCleskey, C. S., and Boyd, Jr., F. A. *J. Milk Food Tech., 12,* 108-9 (1949).

Average number of coliforms present in crabmeat samples tested at the end of a storage period was almost 100 times initial number, while number of enterococci remained practically unchanged.

262I. The effect of ultrasonic waves upon Klebsiella pneumoniae, Saccharomyces cerevisiae, Miyagawanella felis, and Influenza virus A.

Hambre, D. J. *J. Bact., 57,* 279-95 (1949).

Using vibrations from a quartz crystal generator, it was found the distance between bottom of container and crystal, age of culture, and cell concentration had no effect on mortality of *K. pneumoniae* being treated. Liquid volume was important because deep layers were not efficiently cooled. The effect of broth and buffer solution is discussed. In no experiments were 100% of the cells or virus destroyed.

263I. DDT substitute.

Canning Tr., 71, 10 Apr. 18, 1949.

Methoxychlor is recommended by specialists at the University of Wisconsin as a substitute for DDT in fly control in dairy barns. A 2½% methoxychlor water suspension is recommended wherever an insecticide is to be applied to inside walls of buildings housing dairy animals, or wherever contamination of milk or milk products may occur. A ½% methoxychlor suspension is recommended for use on cattle.

264I. Quantitative comparison of insecticides.

Hoffman, I. *Pharmazie, 3,* 353-4 (1948); *Brit. Abst., BIII, 20,* Jan., 1949.

The toxicity (including symptoms) of DDT, HCN, arecoline, nicotine, CH_2:CH.CH_2.NCS (I) and CH_2Ph.CNS (II) to fish, tadpoles, snails, gnat larvae, *Daphnia* and *Enchytracae* has been studied. Arecoline is of only moderate toxicity; DDT and HCN show high toxicity to fish, amphibians, and insects, but crustaceans, gastropods and annelids are relatively insensitive to both. Against the three last-named, I and II are most effective. The results are discussed in terms of metabolic poisons (generally active except where an unusual type of metabolism occurs), nervous poisons (active against higher or lower organisms according as they affect generalized or specific centers), and general protoplasmic poisons (equally toxic to all organisms).

NUTRITION

265I. The effect of thyroxine on the metabolism of lactating cows. 1. General results and nitrogen metabolism.

Owen, E. C. *Biochem. J., 43,* 235-43 (1948).

The effect of injecting 10 mg. thryoxine/day for 4 weeks into cows at three different levels of food intake has been investigated. The resultant increase in milk yield was accompanied by an increase in pulse rate, by loss of weight, by markedly negative nitrogen balance and by an increase in the excretion of water and creatine in the urine. The percent of fat in the milk was increased, and small but statistically significant increases were observed in the percent of solids and of nitrogen in the fat-free milk. Thyroxine appeared to stimulate lactation by increasing the cows' catabolism, and this resulted in negative nitrogen balances. The negative nitrogen balances could be inhibited by increasing the intake of food.

266I. The effect of thyroxine on the metabolism of lactating cows. 2. Calcium and phosphorus metabolism.

Owen, E. C. *Biochem. J., 43,* 243-7 (1948).

Calcium excretion was markedly increased, attributably to faecal metabolic calcium, calcium reserves being readily depleted, resulting in a negative balance. Phosphorus balance, however, was positive, thyroxine increasing the amount of phosphorus retained. The calcium content of the milk was not affected by thyroxine but the phosphorus content was increased.

267I. Reduction of iron in the human stomach.

Bergeim, O., and Kirch, E. R. *J. Biol. Chem., 177,* 591-6 (1949).

Studies have been made in human subjects on the intragastric reduction to the ferrous form of ferric iron present in, or added to, ingested foods. Very appreciable reductions occurred. Thus, a number of common foods such as breads, meats, and fruits gave iron reductions as high as 50 to 90 percent. Milk and eggs gave somewhat irregular results. Ascorbic acid, proteins, and protein digestion products appear to participate in the reduction of iron. The formation of insoluble complexes of ferric iron with proteins, phosphates, and other substances is a limiting factor.

FOOD PRODUCTS

CEREALS AND GRAINS

268I. Comparison of certain chemical, physical, and baking properties of commercial, Buhler, and Hobart-milled flours.

Finney, K. F., et al. *Cereal Chem., 26,* 72-80, Jan., 1949.

Commercial, Buhler, and Hobart flours were extracted from sub-samples of each of seven commercial lots of wheat, representing the classes soft red winter, hard red winter, and hard red spring. The three types of millings were compared with respect to flour yield, loaf volume potentialities, mixing and oxidation requirements, cookie spread factor and top grain, and other physical and chemical properties including granulation, baking absorption, gas production, and crude fat, ash, and protein contents.

269I. Hygroscopic equilibrium of rice and rice fractions.

Karon, M. L., and Adams, M. E. *Cereal Chem., 26,* 1-12, Jan., 1949.

An investigation has been made of the rate of sorption and desorption of moisture by rough rice, head rice, bran, polish, and hulls over the range of 11 to 93% relative humidity at 25° C. The hygroscopic equilibrium of these same fractions has been determined over the same relative humidity range. If the relative humidity of the atmosphere at 25° C. is raised from 10 to 90%, the moisture content of whole rice and its fractions increases as follows: rough rice from 4.4 to 17.6%, polished rice from 5.2 to 18.8%, bran from 5.0 to 18.0%, polish from 5.3 to 18.0%, and hulls from 3.7 to 15.3%.

270I. Inactivation and removal of proteolytic enzymes from amylolytic supplements.

Dirks, B. M., and Miller, B. S. *Cereal Chem., 26,* 98-109 (1949).

The addition of NaCl (4.3 M) to a fungal extract caused marked reduction of proteolytic activity and relatively little loss of amylolytic activity. Dialysis against 0.2% $CaCl_2$ solution for 36 hours did not reactivate the proteolytic enzymes. In the presence of NaCl (4.3 M), adjustment of the extract to pH 10.0 resulted in 80 to 90% reduction of the original proteolytic activity with a small, but significant, loss of α-amylase.

FATS AND OILS

271I. Rancidity of butterfat.

Mukherjee, S., and Goswami, M. *J. Indian Chem. Soc., 24,* 239-48 (1947); *Chem. Abst., 43,* 2337[a] (1949).

Both the hydrolytic and oxidative rancidity of butterfat are practically stopped for 5 months by the presence of dissolved H which is added at 60° to obtain maximum solubility. Other effective rancidity stabilizers for butterfat were pyrogallol, catechol, Na citrate, and Na K tartrate.

272I. Relation between odor, peroxide, aldehyde, and acid content of rancid lard.

Hamann, V. *Dtsch. Lebensmitt. Rdsch., 44,* 161-162 (1948); *Brit. Abst. BIII, 89* (1949).

Souring plays no decisive part in the spoilage of lard, and the presence of ketones cannot be demonstrated. Aldehydes are formed from both saturated and unsaturated fatty acids, at the expense of peroxide formation, and determine the degree of spoilage.

273I. Norconidendrin: A new antioxidant for fats and oils.

Fisher, G. S., Kayme, L., and Bickford, W. G. *Manuf. Conf., 29,* 24-6, Apr., 1949.

The preparation of norconidendrin from western hemlock

sulfite waste liquor is described. Norconidendrin has been shown to possess antioxidant activity in both hydrogenated and unhydrogenated cottonseed and peanut oils, in a peanut oil essentially free of natural antioxidants, and in lard. Its activity in these products is comparable with that of other polyphenolic antioxidants. Norconidendrin, as well as the other polyphenols tested, exhibited greater antioxidant activity in the particular peanut oils used than in several other vegetable oils, and still greater activity in substrates which contained only small amounts of natural antioxidants. The effectiveness of norconidendrin was found to be appreciably enhanced by the addition of acid-type synergists. It may be added either before or after deodorization with approximately equal effectiveness. When added before deodorization, it contributes no odor, color, or flavor to the finished oil. Practical application of norconidendrin in preserving food products should be postponed until toxicity studies have been conducted.

FRUIT AND FRUIT JUICES

274I. The effect of sunlight on the ascorbic acid content of strawberries.

ROBINSON, W. B. *J. Agr. Res., 78,* 257-62 (1949).

The synthesis of ascorbic acid in strawberries is stimulated by exposure to sunlight. With a 57% decrease in the amount of illumination during development and ripening, the ascorbic acid content averaged 36% lower. The data indicate that the degree of illumination of the leaves is the most important factor in this relationship. The amount of ascorbic acid in the ripe fruit appears to correspond to the amount of illumination on the fifth or sixth day prior to harvest. Differences in ascorbic acid content of strawberries on the fresh-weight basis occurred at different locations with the same amount of illumination. However, if the ascorbic acid is expressed on a dry-weight basis, the differences due to environmental factors other than sunlight were insignificant.

275I. Organic acids of some common fruits.

BRYAN, J. D. *A. R. Agric. hort. Res. Sta. Bristol,* 138-40 (1946); *Brit. Abst. BIII, 88* (1949).

The malic, citric, and oxalic acid contents of gooseberry, tomato, apple, plum, blackcurrant, and rhubarb were determined. Citric and malic acids are the major components (80%-90%) of the fruit acids. Rhubarb contained 3-4% (dry wt.) of oxalic acid; in fruits the value was <0.2%.

276I. Factors influencing composition of tomato.

POLLARD, A., KIESER, M. E., AND BRYON, J. D. *J. Soc. Chem. Ind., Lond., 67,* 281-283 (1948); *Brit. Abst., BIII, 10,* Jan., 1949.

Values for ascorbic acid, sugar and free acid content of 7 varieties of commercial tomatoes have been obtained over 4 years. Differences in composition are due to variety and cultural treatment. Fruit produced under glass contained less ascorbic acid, more sugar, and had a better flavor than did fruit grown out of doors. The values of the three components could not be related to number of hours of sunshine or to air temperature at harvesting time. The yield of ascorbic acid per plant is more related to cropping capacity than to the ascorbic acid concentration of individual fruit.

277I. Behavior of SO_2 in concentrated orange juice.

INGRAM, M. *Food Res., 14,* 54-71, Jan.-Feb., 1949.

Observations were made of total (distillable) and free (iodine-titratable) SO_2 in 65° Brix concentrated orange juices under various conditions of treatment and storage. Recoverable SO_2 diminished in storage, losses being accelerated by temperature increase, especially above 20° C. During fermentation, there was no substantial change in total SO_2.

MEAT AND FISH

278I. Effect of ozone on microbial growth on beef muscle, and on the flavor of beef fat.

KEFFORD, J. F. *J. Council Sci. Ind. Research, 21,* 116-40 (1948); *Chem. Abst., 43,* 781^h (1949).

Studies of the growth of microorganisms on beef muscle slices and on artificial media, in the presence of O_3, established the importance of surface moisture content in determining the magnitude of the effect of O_3 on microbial growth. O_3 applied for 3 hours daily in concentration of 3-5 p.p.m. had no effect on bacterial growth at 1-5° on muscle at full moisture content and only a slight retarding effect at moisture contents around 180% (as % dry weight); but when the moisture content was below 150%, a useful extension of storage life was possible, provided ozonization commenced during the lag phase of bacterial growth. O_3 treatment under the conditions mentioned produced readily detectable taints in beef fat in 3-5 days and darkening of muscle pigments in 5-6 days. A KI absorption method for the determination of O_3 in concentration down to 1 p.p.m., and a small all-glass ozonizer, are described.

279I. Behaviour of water-soluble nitrogen compounds during the drying of meat.

GRAU, R. *Ztschr. Lebensmittel-Untersuch. Forsch., 86,* 188-95 (1943); *Nutr. Abst. Rev., 18,* 290, No. 1699 (1948).

Loss of flavour during the drying of lean beef was paralleled by a decrease in the water-soluble N. Higher drying temperature caused greater difference. A very small amount of volatile nitrogenous compounds was recovered during drying by freezing the evaporated water and washing the air stream with alcohol, acid and alkali solution. It was concluded that the soluble N-containing substances are coagulated by heat.

280I. Composition and nutritive value of fresh cooked and processed swordfish.

LOPEZ-MATAS, A., AND FELLERS, C. R. *Food Res., 13,* 387-95 (1948).

Samples of swordfish were frozen, dehydrated, and canned, and analyzed for protein, amino acids and vitamin content. The ten essential amino acids were found present in swordfish in amounts very similar to those present in beef. Canning and broiling as compared with freezing did not significantly affect the essential amino-acid composition. The dehydrated sample showed losses which are considered significant. Pantothenic acid and choline were present in frozen swordfish in moderate to high amounts. After the processes of dehydration, canning, and broiling, good retention was observed, in general, for Vitamin A, riboflavin, and nicotinic acid and low retention for thiamin and biotin. The growth-promoting values of the proteins of swordfish muscle, beef, and chicken were determined for albino rats, using "paired" feeding technique. They were found to be approximately the same.

NUTS

281I. Thiamin, riboflavin, and niacin content of walnuts.

JENTSCH, M. S., AND MORGAN, A. F. *Food Res., 14,* 40-3, Jan.-Feb., 1949.

The riboflavin content of these walnut samples determined by the microbiological method was usually found to be about 20% less than appeared present when the flourometric method was used. There was little loss of riboflavin in storage, up to 42 months, whether the kernels were stored in or out of the shells. The Placentia, Payne, and Franquette nuts contained 0.13 to 0.16, 0.11 to 0.16, and 0.10 to 0.12 mg. % riboflavin. Niacin, determined by the microbiological method, was also retained well in storage, whether the kernels were in or out of the shells. The Placentia, Payne, and Franquette nuts contained 0.81, 0.73, and 0.58 mg. percent niacin. Comparable values were found in the nuts of the four crops, but in all cases the Franquette variety appeared to contain 20 to 30% less of each of the three vitamins than did the other two varieties, which were alike in value. Dark-colored kernels of the 1945 Placentias contained 25 to 30% less of thiamin and riboflavin than did the comparable light- and amber-colored ones.

282I. Salted nuts and process for making the same.

KELLY, W. W. 2,468,078, Apr. 26, 1949.

The process of preparing salted nuts, consisting in roasting shelled raw nuts under dry condition so as to expel all moisture quickly therefrom, applying a moisture-repellant coating to only the outer surface of each nut under substantially moisture-free condition so as to provide at once a moisture-proof coating upon the nuts and thereby preserve their freshness, flavor and crispness, cooling the nuts, and applying salt to only the outer surface of the edible coating.

VEGETABLES

283I. Conserving vitamin C in peas during processing.

MOYER, J. C., ROBINSON, W. B., AND KERTESZ, Z. I. *Canner, 108*, 18-9, Apr. 23, 1949.

Vitamin C losses were found to be due to the leaching action of hot water during blanching and to enzymatic destruction. The losses due to enzyme action varied with the blanch temperature. A short, high temperature blanch yielded more nutritious peas than a low blanch temperature.

284I. The vitamin C content of dehydrated potatoes.

KRONER, W., AND LAMEL, H. *Spiritusindust., 65*, 143-4 (1942); *Biol. Abst., 22*, 2365, No. 23503 (1948).

The 2, 6-dichlorophenol-indophenol method is not appropriate for determining the vitamin C content of dehydrated potatoes. The dye reducing capacity of the potato decreases during the first stages of dehydration, reaching its lowest point at a water content of about 65% of the fresh material. With further dehydration, the reducing capacity increases again. This is evidently due to reducing substances other than ascorbic acid. For the determining of the anti-scorbutic activity of dehydrated potatoes, it is necessary to use an animal test instead of the titrimetric method of Tillmans.

285I. Use of growth-substance to inhibit the sprouting of potatoes in storage.

LUCKWILL, L. C. *A. R. agric. hort. Res. Sta. Bristol*, 79-84, 1946; *Brit. Abst., BIII, 16*, Jan. 1949.

Sprouting of stored potatoes was inhibited by treatment with Me naphthylacetate (1). Shredded newspaper and talc were satisfactory carriers for the growth substance, but dry soil rendered the treatment ineffective. Best results were obtained by use of 0.5-3.0 oz. of (1) per ton of tubers according to the period of preservation desired.

286I. Folic acid in vegetables and certain other plant materials.

FAGER, E. E. C. et al. *Food Res., 14*, 1-8, Jan.-Feb., 1949.

A hog kidney conjugase has been used to liberate bound folic acid in plant materials. The folic acid contents of samples of fresh and canned vegetables, grains, and breakfast cereals are reported. Folic acid in fresh vegetables is maintained at 4 to 5° C. refrigeration.

News of the Institute

(Continued from page 2 preceding technical papers)

the 1930's he attended the Quartermaster Subsistence School, located at the Chicago Quartermaster Depot, and later served on the instructional staff of this organization. In the 1920's as an infantry officer he developed a keen interest in rations and sought to improve the methods of handling and preparing them. Even in that period, when war seemed remote, he realized the military implications of his favorite slogan—"better food for a stronger nation." Later on, in ways already mentioned, he was instrumental in giving substance to this slogan.

Colonel Lawrence has published a number of articles in Army and industrial journals and is widely in demand as a convention speaker. His versatility enables him to delight his audience with a tall tale from his beloved South and to pass from that to a clear exposition of a weighty technical problem or a difficult point of policy. On retirement from the Army, Colonel Lawrence will maintain two important ties with the industrial family. His I. F. T. secretaryship will on the one hand keep him in close touch with the food industries and his recent affiliation with Commonwealth Equipment, Inc., will serve on the other to maintain his interest in materials handling equipment.

WORLD PRODUCTION OF LIVESTOCK AND MEAT

F. A. O. Commodity Series No. 12 reported as follows:

"The volume of world meat production in 1948 is estimated to have been from 5 to 10 percent less than the 1934-38 annual average and slightly less than 1947 production. Europe's production was still at only 62 percent of the 1934-38 average and showed no significant increase over 1947. Pork production in Europe was at only 55 percent of the prewar level, and beef and veal at 71 percent. In North America, on the other hand, meat production in 1948 was at 135 percent of prewar, and in Oceania and South Africa it was 9 percent above the prewar average for these regions.

"World livestocks numbers in early 1948 were not far different from prewar; there had been a slight rise in cattle numbers and a drop of 5 or 6 percent in numbers of hogs and sheep. European livestock numbers have expanded very little since 1945. Hog numbers in Europe in 1948 were about 61 percent of prewar, cattle numbers about 84 percent, and sheep numbers about 80 percent. Cattle numbers in North and South America, on the other hand, expanded significantly during this period.

"The livestock-feed situation for 1948-49 is much improved over that of a year earlier, and more favorable than it has been since before the war. In Europe, feed concentrate supplies in relation to livestock numbers are again near the prewar level, and in Canada and the United States concentrate feeds per consuming animal unit are the highest on record. As a result, some expansion in livestock numbers is expected to occur in 1949, particularly in hog numbers. Most European and North American countries are expecting a substantial increase in the 1949 spring pig crop as compared with 1948, and cattle and sheep numbers in Europe are likely to advance slightly.

"Almost 90 percent of the world's meat is consumed in the regions where it is produced. The chief meat-producing countries, therefore, have the highest per caput meat consumption rates. Consumption in Argentina, Uruguay, and Australia in 1948 averaged 110 kilograms per person. In North America, although some reduction has occurred as compared with 1947, consumption in 1948 was still considerably above the prewar level, the per caput average in Canada and the United States being 71 kilograms as compared with 60 kilograms prewar. In contrast, the consumption rate in Europe in 1948 was about 23 kilograms per person, a rate that is only 62 percent of the 1934-38 average. In India and Japan it was about 3 kilograms."

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Selected Abstracts

ANALYTICAL METHODS

287I. Determination of water by Karl Fisher reagent.

SEAMAN, W., MCCOMAS, JR., W. H., AND ALLEN, G. A. *Anal. Chem., 31,* 510-12 (1949).

A modification is proposed by the Karl Fisher method for the determination of water. Instead of using a single solution containing SO_2 pyridine, methanol, and iodine, two solutions are used: one containing pyridine, SO_2 and methanol, to be used to dissolve or suspend a sample, and the other containing iodine and methanol to be used for titration. The method avoids the decomposition that occurs with the usual Fisher reagent; it thus eliminates the necessity for frequent restandardization, and the waste of a relatively expensive reagent which occur with the original Fisher method. The precision is of the same order of magnitude as for the original method.

288I. Partition chromatographic separation of adenine and guanine.

EDMAN, P., et al. *J. Biol. Chem., 178,* 395-8 (1949).

These nucleotides are isolated from tissue and recovered as the silver salts which are decomposed and taken up in NaOH plus a mixture of methylene glycol and N-butanol. This mixture is chromatographed upon a starch column, developed, and the exudate read on the spectrophotometer. The E values of the two are quite different.

289I. Urea hydrolysis for precipitating calcium oxalate.

INGOLS, R. S., AND MURRAY, P. E. *Anal. Chem., 21,* 525-7 (1949).

The use of the hydrolysis of urea for raising the pH of a solution containing both the calcium and oxalate ions permits the formation of large, readily filtered crystals of calcium oxalate. These are less contaminated by magnesium or aluminum oxalate or excess oxalate due to the presence of the sulfate ion, than the small crystals formed by the standard method, while the over-all time for a set of duplicate determinations for calcium is reduced by the use of urea from 90 min. to 40 to 50 min.

BIOLOGICAL SCIENCES

MICROBIOLOGY

290I. The influence of hydrostatic pressure on the growth and viability of terrestrial and marine bacteria.

ZOBELL, C. E., AND JOHNSON, F. H. *J. Bact., 57,* 179-89 (1949).

At 30° C. the terrestrial organisms developed abundantly within 48 hours at normal pressures, but none multiplied perceptibly under 600 atm., and failure to grow after decompression showed that some had been sterilized by this pressure during incubation. Growth of most was visibly retarded by a pressure of 400 atm., and plate counts indicated growth was slower and death faster at 300 atm. than at normal pressures. Marine species isolated from depths where the pressure is 500 atm., grew readily under 600 atm. at both 30° and 40° C. in the laboratory. The term "barophilic" is introduced to characterize species whose growth or metabolism is favored by pressure. The effect of pressure in all cases depended on temperature. Lower tempertures made pressure effects greater while higher temperatures decreased or even reversed the effects of pressure.

291I. Fermentation of glucose by suspensions of Escherichia coli.

STOKES, J. L. *J. Bact., 57,* 147-58 (1949).

The claim of Rona and Nicolai, based on manometric experiments, that *E. coli* ferments glucose to form two moles of lactic acid per mole of sugar was not confirmed. Instead, manometric work showed 2.5 moles of acid formed while chemical analyses showed .8 moles each of ethanol and acetic acid, 1.2 moles of formic acid, 0.2 moles of lactic acid and 0.4 moles of succinic acid. These amounts account completely for all sugar dissimilated. The pH greatly affects yields in fermentations in phosphate, but not those in bicarbonate buffer.

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The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 2)

2921. Bacteriostasis in the amino-acid series. I. Derivatives of alanine.

ELLIOTT, D. F., FULLER, A. T., AND HARINGTON, C. R. *J. Chem. Soc.*, 85-9 (1948).

It is known that inhibition of bacterial growth can be effected by structural analogues of naturally occurring amino-acids; it is also known that all natural aromatic and heterocyclic amino-acids are β-substituted alanines. These considerations led to a search for antibacterial activity among alanines substituted in the β-position by pyridine, quinoline, and basic derivatives of benzene. Significant inhibitory actions have been observed with three compounds, β-ω-amino-ρ-tolylalanine, β-6-methoxyquinoly (4) alanine, and β-pyridyl (4) alanine; these inhibit haemolytic streptococcus in broth in the range 1:2000 to 1:5000, and the last shows some action against *B. coli* in synthetic medium.

2931. The determination of the holding time in high-temperature, short-time pasteurizing units.

JORDAN, W. K., HOLLAND, R. F., AND WHITE, J. C. *J. Milk Food Tech., 12,* 87-92 (1949).

Dye, salt, and bacteria were used to measure holding time in high-temperature short-time pasteurization units. Apparatus and techniques are described.

NUTRITION

2941. Food habits of freshmen at Oregon State College.

YOUNG, C. B., AND STORVICK, C. A. *J. Am. Diet. Assn., 25,* 318-21 (1949).

Sixty-four percent of the subjects had fair diets, 19% had good diets, and 17% had poor diets. Freshman men had better diets than freshman women. Breakfast consumption showed a direct relationship to diet score. No correlation was made between dietary histories and the condition of the teeth, since the dietary records were based on the present food habits of the subjects and did not necessarily reflect their food habits before they came to college.

2951. Cobalt deficiency among sheep in New Hampshire.

KEENER, H. A., PERCIVAL, G. P., AND MORROW, K. S. *J. Anim. Sci., 7,* 16-25 (1948); *Brit. Abst., BIII, 25,* Jan., 1949.

Although only border-line cases were encountered in field studies (the deficiency was due to Co-deficient hay grown locally), the average gain in weight of sheep receiving 2 mg. of Co per day per head was 2.5 times that of the untreated controls.

2961. Some effects of feeding thyroprotein to dairy cows during their first lactation.

THOMAS, J. W., MOOR, L. A., AND SYKES, J. F. *J. Dairy Sci., 32,* 278-91 (1949).

If extra feed is not fed, the cows show a period of stimulated milk production followed by a rapid decline. When extra feed (25% over requirement) and thyroprotein were fed simultaneously, high production was maintained throughout lactation. The gross efficiency for milk production apparently was unaltered by feeding thyroprotein. Also the net efficiency for the corresponding level of nutrient intake was unchanged. The percent fat in the milk of thyroprotein fed cows was increased above that of normally fed cows for a period of only 30 to 40 days. The heart rate was increased by feeding thyroprotein. Poor producing cows respond less than do good producers. It is not possible to make a good producer out of a bad producer by feeding thyroprotein.

2971. Further observations on the effect of protein upon roughage digestion in cattle.

BURROUGHS, W. et al. *J. Animal Sci., 8,* 9-18, Feb., 1949.

Improvement in roughage digestion occurred in every series with dried skim milk additions where starch formed a part of the ration. Little or no improvement in corncob digestion was noted with dried skim milk addition when no starch was fed. The protein requirement for efficient roughage digestion in cattle is extremely low when roughages are fed in the absence of starch or starchy grains. When starch forms a part of the ration, the need for protein supplement, dried skim milk, is increased in maintaining roughage digestion. Further study is needed as to the exact method by which starch increases the protein supplement needs for efficient roughage digestion in ruminants.

FOOD PRODUCTS

CANNED FOODS

2981. Effect of storage on vitamins and quality in canned foods.

FEASTER, J. F., TOMPKINS, M. D., AND PEARCE, W. E. *Food Res., 14,* 25-39, Jan.-Feb., 1949.

In storage, ascorbic acid and thiamin are the vitamins most affected. Beyond initial short storage periods, temperature is of most importance. At 21° C. retention of these vitamins is 75 to 90%. Other vitamin retentions are even higher. Quality is also influenced by storage conditions. At 21° C. or below, most canned foods suffer marked changes after 1 year. Some canned foods are better stored under refrigerated conditions.

2991. Effect of pH on thermal process requirements of canned foods.

SOGNEFEST, P., et al. *Food Res., 13,* 400-16 (1948).

Thermal death time tests were carried out on freshly prepared vegetable purees of asparagus, green beans, beets, carrots, white and yellow corn, peas, sweet potatoes, pumpkin, and spinach, to which various amounts of HCl and NaOH were added in order to modify the natural pH values. Heating tests on a standardized spore suspension of N. C. A. 3679 and, to a smaller extent, spores of *Cl. botulinum*, were made in vegetable puree within the pH range of 4.5 to 9. Spoilage results indicate that the lower the pH of raw vegetable within the range of 4.5 and 9, the lower the sterilizing value needed to insure a commercially sterile product. Thermal processing of nonacid foods tends to lower the pH. In general, the higher the pH of the product before heating, the greater the effect of heat in lowering the pH. The higher temperature equivalent processes caused less pH reduction than did the lower temperature processes in the range of 260 to 230° F.

CEREALS AND GRAINS

3001. Effect of varying concentrations of certain metals and their salts on gas production and loaf volume.

FINNEY, K. F., MCCAMMON, J. F., AND SCHRENK, W. G. *Cereal Chem., 26,* 140-7 (1949).

Spectrographic examination of filings from the planetaries of a new 100 g. bread dough mixer indicated the presence of cadmium. Cadmium was also detected spectrographically in the ash of bread baked from dough mixed in the new mixer. These cadmium-plated planetaries materially inhibited yeast fermentation, thereby resulting in reduced gas production and loaf volume.

Gas production and bread-baking studies were carried out with varying concentrations of cadmium and its chloride along with the salts of other important metals (chromium, nickel, tin, zinc, copper, magnesium, and manganese) used in plating and in aluminum and steel alloys. Salts of lead and mercury were included for academic reasons.

The enzymes of yeast are inactivated either completely or in part by certain of these metallic salts regardless of concentrations, and by others only at specific concentrations. As little as 1 p.p.m. cadmium chloride produces a material reduction in yeast activity and loaf volume.

Chromium, nickel, or tin, and preferably the first two, are biologically safe when used for plating surfaces that come in contact with yeast-fermented doughs.

3011. Hygroscopic equilibria of whole kernel corn.

BROCKINGTON, S. F., DORIN, H. C., AND HOWERTON, H. K. *Cereal Chem., 26,* 166-73 (1949).

The relative humidities of air in equilibrium with shelled yellow corn conditioned to moisture contents between 9.4 and

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Abstracts

(Continued from page 4)

22.6% were determined at 80° ± 0.2° F. with a new type of electric hygrometer. Moisture determinations were carried out with the Brown-Duvel apparatus as well as by a two-stage vacuum oven technique in which the second stage involved drying at 135° C. in a vacuum oven for 5 hours. The critical moisture content of shelled, yellow corn for safe storage, namely that in equilibrium with a relative humidity of 75% was found to be 13.8 ± 0.2% by the Brown-Duvel method and 14.7 ± 0.1% by the two-stage vacuum oven technique.

FRUIT AND FRUIT JUICES

302I. Apple as a source of vitamin C.

POLLARD, A., KIESER, M. E., AND BRYAN, J. D. *Ann. Rept. Agr. Hort. Research Sta., Long Ashton, 200-2* (1945); *Chem. Abst., 43,* 2338c (1949).

The vitamin C contents of numerous varieties of English apples are recorded. Cider varieties generally showed the highest values (9.1-34.1 mg. per 100 g. of fresh tissue).

303I. Vitamin C content and juice quality of exposed and shaded citrus fruits.

WINSTON, J. R., AND MILLER, E. V. *Food Res., 13,* 456-60 (1948).

Vitamin C content was found to be significantly higher in fruit from outside branches than in those from inside branches of the same tree. This was true for all varieties of round oranges studied as well as for Temple Oranges and Barcy Tangerines. Percentage of total soluble solids was significantly higher in the exposed fruit of all varieties tested.

304I. Ascorbic acid content and sugar-acid ratios of fresh fruit and processed juice of tomato varieties.

SCOTT, L. E., AND WALLS, E. P. *Proc. Amer. Soc. Hort. Sci., 50, 269-72* (1947); *Biol. Abst., 22,* 2366, No. 23519 (1948).

Ascorbic acid content of fresh fruit of 11 varieties ranged from 17.1 to 25.1 mg. per 100 g. Ascorbic acid content of processed juice stored 8 weeks was 84.6% that of fresh fruit and 85.7% that of raw juice immediately after extraction. Varietal differences were not sufficiently great to justify selection of any variety tested for manufacture of juice of high ascorbic acid content. Total acidity of fresh fruit, expressed as citric, ranged from 0.273 to 0.416%. Acidity of processed juice ranged from 0.376 to 0.537%. Sugar content of the fresh fruit ranged from 2.28 to 3.58% among varieties. Sugar-acid ratios of the juices were in close agreement with organoleptic ratings of blandness and acidity.

NUTS

305I. Pasteurization of black walnut meats.

ERICKSON, H. D., AND COLMER, A. R. *Food Res., 13,* 417-31 (1948).

Combinations of temperature and relative humidity effective in killing the coliforms on nut meats in a 30 min. period were as follows: 150° F. and 90%, 160° F. and 80% and 180° F. and 70%. A combination of 200° F. and 50% was also effective and required less treating time. It is suggested that a relative humidity of 50 to 70% be used as one of the factors of the pasteurization procedure. With such relative humidities the operation of the kiln is facilitated, the original moisture content of the nut meats is altered by little, and danger of mold growth in storage is small if the nuts are of proper dryness before processing.

306I. Effect of heat upon the nutritive values of peanuts. II. Riboflavin and pantothenic acid content.

DUNN, K. R., AND GODDARD, V. R. *Food Res., 13,* 512-17 (1948).

Microbiological assays for riboflavin and pantothenic acid were performed on Virginia-type raw peanuts. Other samples of the same peanuts were assayed following boiling, roasting at 160° C., and roasting at 180° C. for 40 min. period. The mean riboflavin value of raw peanuts was found to be 97 ± 4.92 μg. per 100 gm. and that for pantothenic acid, 2,715 ± 83.9 μg. per 100 gm. Boiling the peanuts produced a loss of approximately one-fourth of both riboflavin and pantothenic acid; while roasting them at 180° C. destroyed one-fourth the riboflavin and almost all the pantothenic acid. Roasting at 160° C. was the most favorable processing method, since none of the riboflavin and only one-fourth of the pantothenic acid was lost. It was concluded that peanuts are a fair source of riboflavin and a very good, or excellent, source of pantothenic acid following favorable processing.

VEGETABLES

307I. The effect of maturity and storage on the carotene content of carrot varieties.

BROWN, G. B. *Proc. Amer. Soc. Hort. Sci., 50,* 347-52 (1947); *Biol. Abst., 22,* 2363, No. 23489 (1948).

Carotene determinations were made on 9 carrot varieties at different stage of growth and on 8 varieties at different periods during winter storage. Varietal differences in carotene content were found. The carotene content of all increased up to 100 days after planting, then remained fairly constant until harvested at 135 days. In storage, the roots generally were found to have increased in carotene content at 30 days, then to have remained at the same level for 60 days.

308I. Effects of spraying a sprout inhibitor on potato plants in the field.

ELLISON, J. H., AND SMITH, O. *Proc. Amer. Soc. Hort. Sci., 51,* 397-400 (1948); *Brit. Abst., BIII, 17,* Jan. 1949.

Houma potatoes were sprayed on July 19 and/or August 19 and/or September 11 at the rate of 300 gals. per acre with aq. Me l-naphthylacetate, 3500 or 7000 p.p.m. July sprays reduced the yield and sp. gr. of the tubers. Sprouting in store was most reduced by the July spray, but the August spray had a significant effect. The lower concentration of the ester was as effective as the higher one. Tubers from the sprayed plants had lowered contents of reducing sugars.

309I. Losses of stored potatoes.

STUIVENBERG, J. H. M. VAN. *Landbouwk, Tijdschr., 706/708,* 151-6 (1947); *Biol. Abst., 22,* 2366 No. 23521 (1948).

Storing 4 varieties of potatoes at 3, 5 and 7° C. until mid-April showed that sugar content was higher when stored at low temperatures. According to the varieties, the tubers could be unsweetened by storing the sweet potatoes at 10-13 or at 24° C. When sugar had been formed at very low temperatures (3-4 months at 1° C.), the Binje variety could not be unsweetened completely. Under ordinary storing conditions, loss of weight by evaporation may after 6 months, amount to 1% to 31%, probably according to variety and conditions of growth and harvest. Drying before storing is recommended against loss by microbes and fungi. In connection with losses by sprouting, the rest period is divided into preliminary rest, deep rest, after rest and dormancy. During after rest and dormancy, all sprouted, when stored at 10° C., only 1 out of 4 sprouted very much at 7° C., while 3° C. was perfectly safe. Treatment with glycolchlorhydrin 0.04 ml./l. at a dose of 10 ml. for 2.5 kg. of tubers greatly reduced sprouting. The effect of coumarin varied according to dose. Under various conditions of storage, all the varieties showed about 10 mg. of vitamin C in 100 g. of tubers. CO_2 storage was detrimental, application of growth substance beneficial.

310I. Investigation on asparagus. 1. Ascorbic acid.

WOLF, J. *Gartenbauwiss., 15,* 109-17 (1941); *Biol. Abst., 22,* 2367, No. 23524 (1948).

The ascorbic acid content decreased from the tip to the base of the asparagus spear. In white spears, the tip contained about 60 mg. ascorbic acid/100 g. fresh weight, the middle of the spear about 24 mg., and the base about 17 mg. In "blue" spears the tip contained about 90 mg. ascorbic acid, the middle about

(Selected Abstracts continued on page 9, following technical papers)

News of the Institute

ACHIEVEMENT AWARD

Presentation of Food Industries Award, 1949 *

Introduction and Remarks on Award Background

By F. K. Lawler

It is with some misgivings that we came to California to present an Award to a Florida citrus company. And probably no one but a naive New Yorker would dare to do such a thing. Yet when one studies the situation a little, he finds many common bonds between the two sunshine states.

Both states have governors by the name of Warren. And Florida's Governor Warren recently married one of California Governor Warren's charming lady citizens. So these two great states are united in holy matrimony.

If we get technical, the citrus process which won the Award started in California when Larry Heid was doing research work out here for the Department of Agriculture. Besides, that process is now being used in this state and probably will be quite as valuable to the food processing industries here as to those in Florida.

So we trust that Californians are every bit as interested in the progress in food technology implied in this award as are the technologists in other parts of the country.

This is the second presentation of the biennial Food Industries Award for achievement in food technology, the first having gone to Atlantic Coast Fisheries in 1947 for the automatic fish filleting process.

As we have previously announced, Florida Citrus Canners Cooperative wins the award this time for its particular process for producing concentrated frozen citrus juice. And we might point out here that the process is a nice combination of technology and engineering. This makes the award all the more appropriate at a time when there is a well-defined trend to advanced food plant engineering, as will be brought out at the discussion session here this evening.

The conditions governing the award competition were approved by the Institute of Food Technologists. The principal ones are:

1. The award is for an improved or novel process of food manufacture, not for a food product itself.

2. The process must have been in commercial use prior to the granting of the award.

3. The process shall have been put into commercial operation since V-E Day.

The Jury of Award consists of 26 members of the Institute and was appointed by President Dutch Diehl. All members are with institutions of higher learning, except one. He is with a health department. So no one on the Jury was associated with any company competing for the award.

If time permitted, I should like to read the names of the Jury members. However, they are listed in our special award article, copies of which you may pick up at the door as you leave this session.

Dr. Prescott served as Chairman of the Award Jury, and since he is engaged in running this morning's session, Dr. Cruess has kindly consented to make the Award presentation for him.

The Food Industries Award is made to a company and not to an individual. Its purpose is to encourage food processors to develop or adopt improved processes.

Such progress is essential to the continued rapid growth of food processing because of its influence in introducing new products, in improving the quality of existing products, and in reducing costs to broaden markets.

Progress of this type likewise is important to the welfare and economy of the nation and the world. It contributes to better health and better living. It helps our economy by providing more profitable markets for things the farmers grow. It also reduces the cost of food, allowing consumers to spend more for other things. This increases the business done by other manufacturers and raises the standard of living in general.

Looking beyond the borders of these United States, progress in food becomes vital to future peace. No less an authority than N. E. Dodd, former Under-Secretary of the U. S. Department of Agriculture, and now Director-General of the Food and Agricultural Organization of the United Nations, recently said:

"The filling of empty bellies is the number one problem of the world today!"

This filling of empty bellies requires the combined efforts of farmers, fishermen and food technologists.

But getting back to the Award, several excellent processes were entered in the 1949 competition. This is an indication of substantial progress in the commercial application of food technology and engineering. We want to compliment each company which entered the competition on the achievement represented by its advanced process. We also compliment each of these companies for an enlightened attitude in respect to talking about what it has done. The closed-door policy of progress-retarding secrecy is not on the books of the firms competing for the Award.

Our only regret is that we did not have an award for every company which entered the competition—and we mean this seriously, so excellent were the processes.

We look forward to future Award competitions which will involve processes as far-reaching in significance as did this one. And each company which did not win this time is invited to enter its process again in 1951. The invitation to vie for the next award is extended, of course, to all food processing companies.

I should like to thank the Award Jury for the excellent job which it did. And I want to express the appreciation of Food Industries for the fine cooperation of the Institute of Food Technologists in the selection of the Award winner and in the presentation of the Award.

Others on this presentation program will give you the details of the citrus process and interpret their significance, and do it much better than I could. But I should like to make one observation.

* Presented before the Ninth Annual I. F. T. Convention, San Francisco, July 11, 1949.

The final link in the chain of developments which made this process so highly successful was efficient heat utilization by way of what might be called the heat-pump principle. That is, heat was taken from one side of the process and pumped by way of refrigeration compressors to the other side, so that the power applied to the compressor motors did double duty.

It strikes me that the potentialities of this principle are worth study by other food processors, because heat and refrigeration both are used in so many of the industry's plants.

The biggest obstacle in the way of wide use of the principle is, of course, the fact that you are dealing with low-temperature heat and may become involved in extensive heat-transfer equipment. But some applications are practicable, others merit investigation.

I now have the honor and pleasure of calling upon Dr. W. V. Cruess, who will make the Award presentation. An outstanding food technologist, educator, author, past-president of the Institute of Food Technologists and above all a charming gentleman, Bill Cruess, of the University of California, needs no introduction to this audience. Dr. Cruess.

Remarks by Dr. W. V. Cruess, member of the jury for the 1947 Food Industries Award, acting for the Chairman, Dr. S. C. Prescott:

Dean Prescott, Ladies and Gentlemen: By way of explanation of my appearance in the role of speaker to present the 1949 Food Industries Award I feel that I should tell you this should have been Professor Prescott's honor and privilege, since he is Chairman of the 1949 Award Committee. However, Dr. Prescott was drafted to serve as presiding officer of this session, making it necessary for some other member of the committee to pinch-hit for him. So that is how it happened. Consequently, I urge Dr. Prescott and Mr. Lawler to feel free to call attention to any omissions or errors on my part and to add to or correct what I may say.

While we are at it we might mention that the award was won by a Florida canning organization and a Californian is making the presentation talk; showing there is no hard feeling between the food technologists of these two rival sun-kissed states.

First of all I wish to commend *Food Industries*, its editor, and management, for establishing this very worthy award, particularly on its present unique basis of open competition. It is not only a reward for accomplishment and progress in food technology; but it is also a very important stimulus to other progressive and enterprising food processors.

The first award was won by the Atlantic Coast Fisheries, Inc. of Boston and New England fish centers, for its continuous and automatic fish filleting machine. Their machine does a better job than hand filleting, and does it at lower cost and at great speed. Dr. B. E. Proctor of M. I. T. presented the 1947 award; there was none in 1948.

The responsibility for reviewing the documents of the competitors and for making the award was given to a jury or committee of twenty-seven men. The jury consisted of the following:

Dr. S. C. Prescott, Massachusetts Institute of Technology, Cambridge, Massachusetts, Chairman.
Baker, George L., Dept. of Chemistry, University of Delaware, Newark, Del.
Bedford, C. L., Dept. of Horticulture, The State College of Washington, Pullman, Wash.
Campbell, W. L., Dept. of Food Technology, Massachusetts Institute of Technology, Cambridge, Mass.
Cruess, William V., Dept. of Food Technology, University of California, Berkeley, Calif.
Douglas, Howard C., Dept. of Microbiology, University of Washington, Seattle, Wash.
Fabian, Frederick W., Dept. of Bacteriology and Public Health, Michigan State College, East Lansing, Mich.
Fellers, Carl, Dept. of Food Technology, University of Massachusetts, Amherst, Mass.
Fieger, E. A., Dept. of Agr. Chemistry and Biochemistry, Louisiana State University, Baton Rouge, La.
Garard, Ira D., Dept. of Chemistry, New Jersey College for Women, Rutgers University, New Brunswick, N. J.
Gould, Ira A., Dept. of Dairy Technology, Ohio State University, Columbus 10, Ohio.
Guerrant, N. B., Dept. of Agricultural and Biological Chemistry, Pennsylvania State College, State College, Penn.
Highlands, Mathew E., Dept. of Food Technology, University of Maine, Orono, Maine.
Howard, L. B., Dept. of Food Technology, College of Agriculture, University of Illinois, Urbana, Ill.
Levine, Max, Bureau of Laboratories, Dept. of Health, Territory of Hawaii, Honolulu.
Maclinn, Walter, Dept. of Food Technology, Rutgers University, New Brunswick, N. J.
Masson, Henry J., Graduate School of Engineering, New York University, University Heights, N. Y.
Nicholas, J. E., Dept. of Agricultural Engineering, Pennsylvania State College, State College, Penn.
Parker, Milton E., Dept. of Food Technology, Illinois Institute of Technology, Chicago, Ill.
Proctor, B. E., Dept. of Food Technology, Massachusetts Institute of Technology, Cambridge, Mass.
Pyke, W. E., Dept. of Chemistry, Colorado A & M College, Fort Collins, Colo.
Shellenberger, John A., Dept. of Milling Industry, Kansas State College, Manhattan, Kansas.
Shuey, George A., General Agricultural Chemistry Dept., University of Tennessee, Knoxville, Tenn.
Stewart, George F., Iowa Agri. Experiment Station, Iowa State College, Ames, Iowa.
Wiegand, Ernest H., Dept. of Food Technology, Oregon State College, Corvallis, Ore.
Woodroof, J. G., Dept. of Food Technology, Georgia Agricultural Experiment Station, Experiment, Ga.
Woolrich, W. R., College of Engineering, University of Texas, Austin, Tex.

A considerable number of food processing organizations entered the 1949 competition; and the products and processes represented were varied. They ranged from fruit concentrates to dairy products. All major sections of the U. S. A. were represented.

The committee members were supplied with comprehensive illustrated statements by the competitors. These were supplemented in several cases by reprints. The committee wishes to compliment all of the contestants on their very clear, informative and interesting presentations. All represented important advances in food processing or engineering; in most cases in both. It was extremely difficult to choose a winner.

Naturally, the various members of the jury showed a wide range of preference in their votes for first, second and third. However, the voting gave this year's winner

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Abstracts

(Continued from page 6, preceding technical papers)

30 mg., and base about 17 mg. per 100 g. In green asparagus, the tip contained 120 mg., the middle about 52 mg., and the base about 20 mg. per 100 g. The ascorbic acid content in the peel is always higher than in the pith-in the middle of white sprouts about 18%, in that of "blue" sprouts about 50%, and in that of green sprouts about 100% more than in the pith. At the base the differences between peel and pith are much smaller—about 17% more in white and blue, and about 50% in green. During cool storage for 4 weeks (—0.5 to 0° C.), a decrease of the ascorbic acid content of the tips to 25% of the content at the beginning of the storage period occurred. In the middle the ascorbic acid content showed at the beginning of storage a decrease of 20%, and thereafter, to the end of the trial, no noteworthy further decrease was found. In the base end, the ascorbic acid content decreased slowly but evenly from 17 mg. to 12 mg./100 g. fresh weight. For short storage at + 12.5° C. (48 hrs.) and at + 18.5° C. (24 hrs.) no noteworthy decrease of ascorbic acid content was evident.

PHYSICAL RESEARCH

311I. Use of dyes to determine the iso-electric point of gelatin.
DICKINSON, H. O. *Nature, 163,* 485-6 (1949).

The following technique has been found to give reliable and reproducible results. To 50 ml. distilled water add 0.5 cc. of 1% gelatin solution, followed by 0.5 cc. of 1:2,000 ethyl alcohol solution of 3:3'-dimethyl 5:5'-dichloro-9-ethyl thiacarbocyanine chloride. If as usual, the pH of the solution is above the iso-electric point, the color will be blue. N/100 HCl is added from a micro-burette until the color of the solution changes from blue to red. Each addition of acid is followed by thorough stirring of the solution. The end-point is reached when the last trace of blue color just disappears from the solution. Measurement of the pH of the solution at this stage gives the iso-electric point. If the end-point is overshot, addition of a slight excess of alkali will enable the titration to be repeated, and by this method several estimations can be made on one sample.

312I. A color translating ultraviolet microscope.
LAND, E. H. et al. *Science, 109,* 371-4 (1949).

An ultraviolet microscope takes three separate pictures of the same object at three separate wavelengths in the ultraviolet. The film is automatically processed, and within ten seconds the three pictures are projected simultaneously, each in a different color. The result is a color representative of the object as it might appear to the eye if ultraviolet light were visible. The instrument uses a motion picture camera.

313I. Starch solutions and pastes and their molecular interpretation.
MEYER, K. H. et al. *J. Phys. Colloid Chem., 53,* 319-34 (1949).

Starch solutions and pastes exhibit peculiar properties which can only be understood through a thorough knowledge of the physical-chemical behavior of the individual components of the starch granule, and in addition, of the morphological organization of the granule. Both components—the unbranched, termed "amylose," and the branched "amylopectin"—show in solution the phenomenon of "aging." This consists in an aggregation of molecule to micellae and finally to a ppt. or a more or less turbid gel. New methods are described to check the purity of amylose and to determine the molecular weight of the components of starch. The results obtained explain the difference in behavior of corn starch and potato starch which is shown, e.g., in swelling capacity, viscosity, and rate of solidification of the respective solutions and pastes.

314I. The structure of starch. The ratio of non-terminal to terminal groups.
BROWN, F., et al. *J. Chem. Soc., 27-32* (1948).

An assay of the proportion of terminal groups present in various starches has been made by measuring the amount of formic acid liberated on oxidation of the polysaccharide by potassium periodate. The results obtained are in good agreement with those derived by measurement of the amount of tetramethyl methylglucoside resulting from the methanolysis of the corresponding methylated starch derivatives. Few, if any, glucose residues linked solely through carbon atoms 1 and 6 can therefore be present in starch. The amylose component of certain starches has been examined and shown to contain approximately one non-reducing end-group for every 250 glucose residues. The yield of formic acid produced on oxidation of the whole starch with potassium periodate, combined with an estimate of the amylopectin content of the starch obtained iodometrically, has enabled a calculation to be made of the ratio of terminal to non-terminal groups in the amylopectin component. For many varieties of amylopectin this ratio is 20:1, but there are exceptions, for example, the amylopectin component of potato, sweet potato, and arrowroot starches, where the ratio is higher.

News of the Institute

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a very substantial majority. The jury would remind the competitors that they are eligible to compete again next year and desires to encourage them to enter again.

In the speaker's case the documents arrived while he was laid up in the hospital with an assortment of broken bones. Reading of the competitors' statements was really beneficial to his recovery by taking his mind off his aches and pains.

Editor Lawler of *Food Industries* gave us several basic factors to consider in evaluating the competing processes. Among these factors were: technological significance, economic importance and success in its special field; protection of the foods handled with reference to sanitation, purity, quality and appearance; possible application in other fields, that is, is it limited to one narrow sector or generally applicable; freedom from operating difficulties; saving in time and of food; complexity or simplicity; and must have been put into operation since V. E. Day, May 8, 1945. The winner's process, equipment and product met these requirements.

The present accelerated pace in advancement in processing technology and engineering makes it necessary for all food processors to keep up with the trend and contribute to further progress. The Food Industries Award competition and annual I. F. T. Conventions do much to keep us abreast.

From personal knowledge we can say that for at least thirty years the citrus industry has been looking for a thoroughly satisfactory orange concentrate. There was needed a citrus concentrate that would on dilution taste like fresh juice and that would not deteriorate in storage. Many wild, fantastic and unsatisfactory processes were invented, and many financial angels lost much money in such schemes.

The Exchange Orange Products Company of Ontario, California, was one of the first to install stainless steel vacuum pans to operate at higher than customary vacuum and lower than usual temperature for production of orange concentrate. Other producers in Cali-

fornia, also, and in Florida installed improved vacuum pans and over the past twenty years have produced considerable concentrate for use in carbonated beverages, frozen desserts, etc., and for shipment overseas for use as a source of vitamin C as a beverage base, particularly for children. While such concentrate if flavored with orange oil gives a fairly palatable drink on dilution with water, it is lacking in fresh flavor and darkens on storage. Still the output in 1947 was around 4,000,000 gallons according to *Western Canner and Packer*.

Canned orange juice while it attained a pack of over 19,000,000 cases in one recent year, also lacks the flavor of fresh orange juice. That was the picture before the new frozen 3 plus 1 concentrate came on the scene. It has been such a great and rapid success that it threatens to steal the spotlight among frozen foods. In some markets it has outsold frozen pack peas, heretofore the number one frozen food in sales volume.

It might be well at this point to mention several of the milestones in the evolution of the process now used for frozen orange concentrate. One of these was a procedure and several machines for continuously concentrating fruit juices and other food liquids by freezing out some of the water and removing it as ice, as developed by Eudo Monti of Italy some forty years ago. A contemporary of Monti was H. C. Gore of the U. S. D. A. who used a centrifuge to separate the ice from the concentrate. More recently Stahl and Jordan in Florida have used a modification of this procedure. They preserved the concentrate by freezing. Joslyn and Hohl state that Stahl and Jordan added fresh juice and juice sacs to their concentrate to improve the flavor and appearance.

While freezing concentration gives concentrates of fresh flavor, it is less convenient to use than vacuum concentration and requires several cycles to attain 50-55° Balling. Some thirty years ago M. K. Serailian patented a process of vacuum concentration in which the volatile flavor constituents were recovered from the distillate and returned to the concentrate.

During the recent world war, evaporation of moisture from the chilled product at very high vacuum and very low temperature was developed. Vacuum Foods Corporation and others pioneered this process and developed equipment for it. It is reported that results were very good.

Among investigators whose research was more closely related to the procedure used by the Florida Citrus Canners Cooperative were J. L. Heid, now of that organization; Dr. L. G. MacDowell, Dr. E. L. Moore and Cedric D. Atkins who are members of the Florida Citrus Commission. The Commission members applied for a patent in 1945. Recently granted, the patent was turned over to the public for use without royalty. It specifies concentration at not above 80° F.; concentrating in vacuo five to eight fold, diluting with fresh juice to a concentration that permits 3 to 4 fold dilution with water at serving, deaerating, sealing under vacuum and preserving by freezing.

The Florida Citrus Canners Association procedure was similar and operated at exceptionally low temperatures to eliminate heat damage to flavor. In an article in *Food Industries* in 1948 J.L. Heid and C. G. Beisel of the Association make the following statement: "Using equipment and methods planned by L. G. MacDowell, Director of Research, Florida Citrus Commission, and J. L. Heid, then Director of the U. S. D. A. Citrus Products Station, Winterhaven, Florida, MacDowell, Moore and Atkins concentrated juice at low pressures without modifying the taste. The flavor of the concentrate was flat, however, due to loss of volatile constituents. But these investigators developed a process for concentrating the juice to 60 percent solids, then adding sufficient unconcentrated juice to reduce the solids to 42 percent. This produced a concentrate which when reconstituted after freezing, could not be distinguished by most tasters from the fresh juice."

That in brief is the process and the product of the Cooperative. The concentrator is very unique in principle and design. It was conceived and designed by Joseph Cross of Mojonnier Brothers Company of Chicago and was built by that company, which also built the pilot plant that preceded the commercial installation. It uses the ammonia refrigerating system; first to provide heat at about 105° F. from the warm ammonia from the compressor and second to provide cooling for condensing the water vapor by the cooling action of expanding ammonia at 45° F.

The final product is at about 42° Balling or Brix. The housewife buys it frozen in 6 ounce cans; opens the can; adds 3 volumes of water; mixes and serves a cold juice of fresh flavor. The brand name of the product is Donald Duck. Try it some time.

It should be pointed out that the Mojonnier Lo Temp Evaporator and the Cooperative's product have application to other products. One company at least is producing a frozen grape concentrate; others are considering or producing other concentrates such as grapefruit, lemon and prune. It is applicable to such products as milk, pectin solutions, table syrups, cereal extracts and syrups, liquid egg, certain pharmaceuticals, sucrose juices, etc. Therefore, it has rather wide application, one of the requirements considered in making the award.

The present speaker has for many years known of "Larry" Heid's research on citrus products for the U. S. D. A. in Florida and California and for the Cooperative at Lake Wales. He deserves much of the credit for devising and developing the final commercial process and product. However, I would like to mention Joseph Cross of the Mojonnier Brothers Company, who decided on the type of Vacuum Concentrator to be built; who designed it and supervised its construction and installation. He cooperated closely with Dr. Heid and others; and deserves great credit for the originality of the equipment design and for its successful installation and operation.

Heid and Beisel of the Florida Citrus Canners Cooperative described the equipment and process quite fully in *Food Industries*, volume 20, pages 516-518, 1948. Cross and Gemmill in the same journal, volume 20, pages 1421-1423, 1948 describe the equipment fully. Readers are referred to these articles for details.

The Frick Engineering Company furnished the compressors and other refrigerating equipment. In their

journal, The Frick System, volume 20, pages 1-3, August-September, 1948 they give an outline of the process and equipment.

There are present here in addition to Dr. Heid, representatives of Mojonnier Brothers Company and of the Frick Company who can give additional information.

The jury wishes to congratulate the Florida Citrus Canners Cooperative on the successful attainment of its high goal of producing commercially and distributing nationally (including California) a frozen pack concentrated citrus juice of fresh flavor, aroma, and appearance. We likewise wish to highly compliment research workers of the Cooperative, of the Florida Citrus Commission, of the U. S. Department of Agriculture, and the Florida Agricultural Experiment Station for the essential, well conceived and capably executed research basic to the present commercial procedures used in this process. To the engineering staff of the Mojonnier Brothers Company and its plant personnel go our congratulations for originality of principle, design and construction of the low temperature evaporator that made the process feasible. We wish also to compliment the Frick Company for its very important part in adapting its ammonia compressing and refrigerating equipment to the proper and efficient handling of the refrigerant in the evaporating system.

And again the jury wishes to compliment the other competitors for their very great contributions to advances in food technology. Editor F. K. Lawler, of *Food Industries*, and Dr. Samuel Prescott, Chairman of the Award Committee, deserve generous recognition for their efficient conduct of the contest.

In presenting this, the second Food Industries Award to you, Mr. D. A. Hunt and the Florida Citrus Canners Cooperative of Lake Wales, Florida, the jury hopes that your successful solution of an old and difficult problem in food technology will be an inspiration to others who are striving to improve food products and processes or to devise and develop new ones. Our sincerest congratulations!

Mr. D. A. Hunt will speak on behalf of the Cooperative.

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Remarks by F. K. Lawler, introducing D. A. Hunt, President, Florida Citrus Canners Cooperative:

As top executive of the company winning the Award for outstanding achievement in food technology, Mr. Hunt is to be commended for his wisdom in backing a winner with a big investment. The commercial possibilities of the frozen concentrate were realized in 1944. And the new and revolutionary plant to produce this product was completed in 1948. In the 4-year interval Mr. Hunt never faltered in his conviction that the progressive step his company was taking was worth the cost. That he was 100 percent correct is now a matter of history.

We know that all food technologists appreciate the value of top executives like Mr. Hunt. Without them the developments made by the technologist and the engineer never would reach that satisfying stage of commercial application.

Incidentally, Mr. Hunt studied citrus culture at the University of Florida after serving in World War I, and he has been engaged in the citrus industry ever since.

Remarks by Mr. D. A. Hunt:

Dr. Cruess, Members of the 1949 Conference of Food Technologists, Ladies and Gentlemen: It is a great pleasure and honor to receive this award on behalf of the Florida Citrus Canners Cooperative. I want to express my thanks to Mr. M. A. Williamson, Vice-President of McGraw-Hill and publisher of *Food Industries* and to Editor F. K. Lawler for making possible this award. It is also my privilege to express our appreciation to the Institute of Food Technologists for making this presentation a part of the Conference Program.

To the twenty-six Professors of Food Technology who acted as judges and saw fit to select us for this honor must go our deepest gratitude. While we are naturally proud of our process for preparing frozen concentrated citrus juices without modification of flavor or food value, I am sure that the distinguished members of the award committee were faced with a tremendously difficult decision in judging among the many outstanding contributions to food processing which have been made within the recent past.

The importance and skill represented in competing processes add luster to the honor which we have received. We are proud to have been selected from such a distinguished field of contenders for this honor, but we are also humble in the realization that we only symbolize the entire field of nominees, since not all could be selected for this presentation.

I should also like to tell you that you are today honoring no individual but some fifteen hundred growers whose courage and foresight made the materialization of this process possible. Our company was organized in 1930 and the first year handled approximately 40,000 boxes of fruit. Today we are equipped to handle over 40,000 boxes of fruit per day.

Reading the inscription on this handsome plaque, which we shall proudly display in Lake Wales, I note the wording: "In recognition of its contribution . . . made possible through a broader participation by food technologists in the affairs of the food processing industry." On behalf of top management, I should like to say that I doubt if a more appropriate statement could have been devised.

The process which is being honored today was conceived in our Research and Development Department which presented it to the management with the recommendation for pilot plant tests. When these tests, conducted with the valued cooperation of equipment manufacturers, were successful, the confidence of our Board of Directors was sufficient to persuade them to appropriate half a million dollars for buildings and equipment which had to be completed before the first commercial package of frozen concentrated orange juice could be produced.

Those results have justified that confidence, which was based upon the fact that for six years our Research and Development Department, its staff members trained in engineering, chemistry and bacteriology, had played an important role in our operation and expansion to a point where we can now process forty to fifty thousand boxes of oranges, grapefruit and tangerines per day into a wide variety of citrus products.

Today we have invested approximately one and a half million dollars in our frozen orange concentrate plant and about four million dollars in our entire operation. Yes, on behalf of Management, it is a pleasure to acknowledge that this contribution was made possible through a "broad participation of food technologists in the affairs of the food processing industry."

I will not attempt to describe the technical phases of the process as that subject will be discussed by Larry Heid who is, I believe, known to most of you. It is rather my purpose to accept this award with the heartfelt gratitude of fifteen hundred Florida citrus growers who are honored here. As their representative, may I repeat my thanks to *Food Industries* magazine, to the Institute of Food Technologists and to the distinguished judges who have accorded us this honor.

Remarks by F. K. Lawler, introducing Larry Heid, Director of Research, Florida Citrus Canners Cooperative:

To supplement the very interesting and pertinent comments by Mr. Hunt, I am going to call upon Larry Heid. As director of research at Florida Citrus Canners Cooperative, Larry had a big hand in developing to outstanding commercial success the process which won his company the award. He is a citrus technologist from 'way back. Many of you who are from California know of the work which he did on the staff of the U. S. Fruit and Vegetable Chemistry Laboratory at Los Angeles 20 years ago.

There he observed that flash heating in high-velocity tubular heaters improved the flavor of canned citrus juice. He also made tests showing that juice which was deaerated, canned and quick frozen could be held at zero degree F. for several years without perceptible deterioration in flavor.

Larry continued his work on processing citrus juice as director of U. S. D. A. Citrus Products Station in Winter Haven, Fla. Here a distinct improvement in the flavor of the juice was made by adding unconcentrated juice to the concentrated product. At this point, Florida Citrus Canners Cooperative decided that frozen concentrated citrus juice had real commercial possibilities. So Larry's part in the development of the award-winning process extends over a period of two decades. Larry, will you tell them about your process and its significance? Mr. Heid.

Remarks by Mr. J. L. Heid:

The President of the Cooperative, Mr. D. A. Hunt, has told you of the part played by management in the development which is being honored. I have been invited to review this development and discuss some of the economic aspects of frozen concentrates.

I

Many individuals contributed directly or indirectly to this development. In 1929, in a barn of a building on South Mission Road in Los Angeles—a Federal laboratory under the direction of E. M. Chace—your speaker began to study the effect of variations in processing methods and storage conditions upon the flavor and keeping quality of citrus juices.

Time will not permit mention of everyone whose work cleared the trail leading to the Lake Wales process, but specific mention is due to those with whom the speaker was directly associated, including Poore, Scott, von Loesecke and Mottern.

Later at Winter Haven, Florida, work was continued in cooperation with MacDowell, Moore and Atkins who later demonstrated a practical method for preparing frozen concentrated citrus juice with the natural flavor of freshly squeezed juice. With this evidence of commercial possibilities a method was sought for preparing uniform, top-quality products at nominal cost on a large scale.

Objectives included:

1. A higher degree of sanitation than had been previously achieved.

2. Uniform high velocity, low temperature concentrating, blending and freezing of juice from selected fruit.

3. Minimizing elapsed time from extraction of juice until amorphously frozen products were sealed out of contact with atmospheric oxygen.

The skills of several equipment manufacturers were enlisted and contributed importantly to the development of a process so different from any previously used that more than two years were required to progress from pilot plant tests to commercial operation.

Special mention is due to the work of J. A. Cross who designed an evaporator to meet specifications which included:

A. Temperature of heating medium not to exceed 115° F.

B. Falling film, multiple stage, single effect evaporation with maximum juice temperature of 60° F. and maximum retention time not to exceed ten minutes.

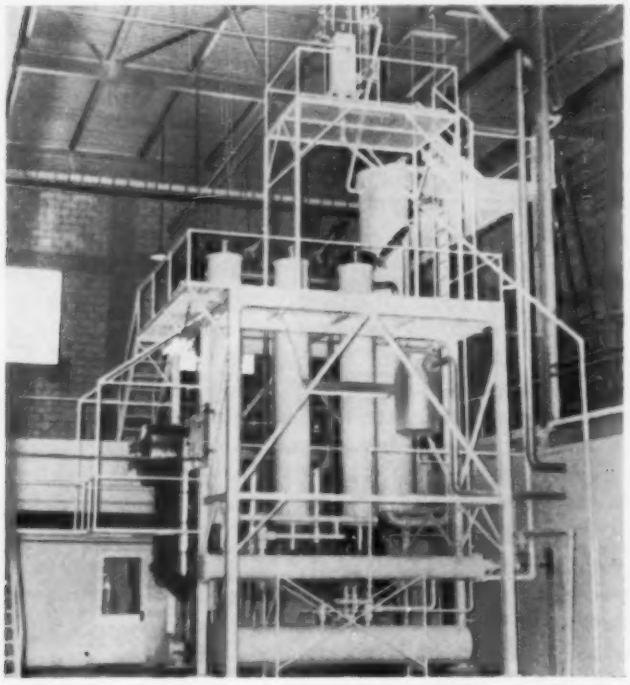
C. Sanitary design which would permit complete cleaning and sterilization and operate without appreciable build-up in microbiological counts.

To achieve such operating conditions in Florida where minimum cooling water temperatures are 80° F., it is

necessary either to compress vapors before condensing or resort to refrigerated condensers. In the Lake Wales process a three stage, single effect, falling film evaporator is operated without steam. Ammonia is compressed in a conventional refrigeration compressor. Latent heat liberated by the condensing ammonia is used to evaporate water from the juice, then vapor from the juice is condensed by evaporating the ammonia. Surplus heat of compression may be removed by warming incoming juice or dispelled in cooling water.

An engineering advantage of this system is that the two pounds of ammonia which must be compressed to provide 1058 B. t. U. occupy a space of only 7.2 cubic feet at 45° F., instead of the 1,208 cubic feet occupied by one pound of water vapor at 60° F. Consequently, a small compressor may be used instead of a large one.

The heat balance of the system has been described by Cross and Gemmel on pages 1421-23 of *Food Industries*, Volume 20, 1948. The initial unit was operated by a 300 h.p. direct connected 4 cylinder, 11″ x 10″ compressor. After four evaporators of this size were installed two larger evaporators were ordered, which are operated by 700 h.p. compressors. This gives a production capacity of 1,000 gallons of 42° Brix frozen concentrate per hour.



Original ammonia compressor operated, three stage, single effect, falling film evaporator in production of concentrated frozen citrus juice by Florida Citrus Canners Cooperative. Latent heat of evaporation furnished by condensing compressed ammonia. Vapors condensed before compression by evaporating liquefied ammonia.

II

In operation, fruit is selected by testing in the grove and again upon delivery to the plant, and is sorted twice to remove every defective fruit. It is also washed three times with special detergents developed during a three year study to provide substantially sterile outer surfaces on fruit entering the extractors.

After extraction, the juice is strained through coarse and fine finishers. Finely strained juice is deaerated and chilled in an ammonia jacketed tubular heat exchanger, before going to the balance tank which supplies the evaporators. This is to prevent enzyme action and growth of microorganisms. After four minutes in the evaporators at 56° F., juice which entered at 10 to 12 percent solids is pumped out with the solids content increased to about 58 percent, and is transferred to cold wall blending tanks in which it is chilled to 26° F. while being combined with pulpy cut-back juice to adjust the soluble solids to exactly 42 percent.

After standardization, it is pumped continuously through a three cylinder slush freezer in which it is cooled to 17° F. at which temperature it has the consistency of sherbet and approximately one-third of the water content is frozen.

The slush is filled in six or thirty-two ounce cans which are sealed under steam blast to exclude air. Then the cans are conveyed through an air-blast tunnel freezer at minus 30° F. to complete the freezing process in two hours, before the cans are cased.

Clean up methods, sanitary and microbiological control procedures were developed by C. G. Beisel. Chemical tests are supervised by S. S. Thompson, and laboratory control is applied by laboratory and production personnel from the time the fruit is harvested until the finished product is released for shipment. Standards have been developed in the plant to insure high quality and uniformity. Routine tests are made for solids, acids, vitamin C, pulp, essential oil and flavor, and total microorganisms. Tile floors and walls in the plant facilitate cleaning. The specially designed and constructed plant represents an investment of approximately one and one-half million dollars, or about $1,500 per gallon of hourly capacity.

Improvements in process and equipment are constantly sought. Evaporator performance has been studied and improved. Initial production is delayed until fruit of suitable varieties is fully ripened. There is an appreciable variation in the process used for oranges and grapefruit juice to compensate for the higher enzyme activity in grapefruit juice. Demand for products has at all times exceeded continuously expanded plant capacity. This is true only because uniform top quality has been guarded so zealously that samples selected at random have repeatedly been preferred to freshly squeezed juice in blindfold group taste tests.

This process of evaporation employed in preparing frozen concentrated orange juice is applicable to a wide variety of biological extracts sensitive to temperature changes. These include blood serum, milk, eggs, fruit juices, antibiotics and similar products. Variations may be applicable for heavy industrial uses, particularly in areas where steam is difficult or costly to generate, or condensing water is limited. Multiple effect evaporators can be constructed to make use of the same principle.

III

Among the questions which are asked most frequently are:

What is the outlook for frozen concentrate?

Does the current boom represent a temporary fad or a revolution in consumer habits?

If high quality products meet an increasingly enthusiastic reception, how fast will production be expanded; what benefits and what hazards will be involved immediately and ultimately for growers, processors and frozen food distributors?

In attempting to answer these questions many unpredictable factors must be considered. There is a prospect that many additional processors will rush into the field of producing frozen concentrate, and how well they may be equipped to produce uniform high quality products and market them constructively remains to be determined.

The prospect for the 1950 season is that there will not be sufficient fruit of suitable quality to operate expanded production facilities to capacity. Whether this will result in poor products, and, if so, what the effect upon the general market will be remains to be seen. The need for quality standards is recognized, but unfortunately no one has been able to propose standards which will accomplish the desired purpose. It may be feared that hastily contrived State standards may have the opposite effect from that for which sponsors hope.

In the past, growers have tended to look upon citrus product manufacture as a salvage operation for grades, sizes and quantities of fruit which could not be profitably shipped to fresh fruit markets. Growers are coming to realize that frozen concentrate with a saving in shipping weight of more than eighty percent can provide quickly and conveniently at any time the full flavor and food value of freshly squeezed juice with no labor, delay or cleaning operation. Such a product cannot be looked upon as salvage; it is a new method for marketing the citrus crop.

Florida stands at a cross roads in marketing methods. If intelligently and constructively developed, frozen concentrated citrus juice offers an unprecedented opportunity to expand markets for citrus fruits in beverage and food fields, because frozen concentrate can be quickly and easily served and is superior in both flavor and food value to soft drinks which enjoy tremendous popularity. Such products have achieved great popularity because they were wisely promoted and because they were stable, easy and profitable to serve. Now, finest flavored orange juice with the flavor and food value of a freshly squeezed product can be served easily at competitive prices.

At 25 cents retail for a six-ounce can (which makes 24 ounces of juice), the price is approximately the same as that of popular carbonated beverages. This year, following the freeze in California and Texas, retail prices were forced to somewhat higher levels by the cost of fruit, but as each six-ounce can represents the juice of approximately 4.3 pounds of oranges, at thirty cents retails this quantity of juice still represents a great bargain when an equivalent quantity of fruit is retailing for fifty cents.

So many startling statements have been made regarding pricing of this product that some consideration of the economic aspects of production are warranted. In Florida the unit of measure for oranges is a ninety pound field box. The cost of producing a box of fruit may vary from 60 to 90 cents, depending upon the size and efficiency of the grove. For all practical purposes an average production cost may be considered at 75c per box and the cost of picking and hauling to processing plants may be estimated at 25c, so a dollar a box may be considered as the minimum price for fruit which will return production costs.

During the 1949 season the price of good oranges for frozen concentrate ranged from $1.00 to more than $3.00 per box, delivered to plants.

A simple calculation reveals the range in concentrate cost represented by this variation. As the yield of concentrate from good oranges of suitable quality ranges from 20 to 23 six-ounce cans per box of fruit, a conservative cost may be calculated upon the 20 can yield, and it is quickly seen that at $1.00 per box the fruit cost is five cents per can, at $2.00 per box it is ten cents a can and at $3.00 per box it is fifteen cents per can.

Can and carton cost is approximately 2.2 cents per can to be added to the above, bringing the cost to $.072, $.122 and $.172 per can for fruit, cans and cartons at the price levels mentioned for fruit.

To these costs must be added the cost of: cleaning and sorting fruit, processing, packaging, freezing, storing and loading the juice, sanitation and waste disposal, control research and development, overhead including management and depreciation on costly facilities, sales and promotion and normal profit. This will give the net f.o.b. cost of finished products. These costs will vary inversely with the size of operations and directly with quality. Some processors claim to be able to cover these costs with four cents a can. Other estimates range as high as six cents.

Using the lower figure, it is seen that with fruit at two dollars a box, and with a twenty can yield, the minimum net cost of frozen concentrate at the processing plant will be $.162 per can. Freight and the cost of wholesale distribution and retail sales must be added. These costs range from five to ten cents a can, so that a retail price range between twenty and thirty cents is required to return growers $1.00 to $3.00 per box of fruit delivered to concentrating plants.

Substitution of inferior fruit or processes to permit lowering of prices is probably suicidal. Canned single strength juice offers the cheapest method of supplying consumers with the food value of citrus fruits. Frozen concentrate can go farther and provide them with the unimpaired flavor of the finest, freshest fruit, economically at a price which competes with that of fresh fruit, plus the advantage that waste and labor are eliminated. Frozen concentrate should not merely taste a little better than canned juice. It should taste as good as the best fruit the consumer ever tasted, if it is to provide citrus growers with an expanding profitable market for their crops. Nothing less than the best will do.

Whether this remarkable technological development will prove a boon or a curse will depend upon the men who control it, which is a major reason why Florida growers are organizing to work for a more orderly marketing of their crop.

(News of the Institute continued on page 16)

INDUSTRIAL ENZYMES

Which of These Will Improve Your Products?

Enzyme System	Designation	Availability	Action on Substrate
Pectinolytic	PECTINOL	Commercial	Demethoxylates pectic substances and hydrolyzes them to galacturonic acid. pH range 3.5 - 5.
	Pectin esterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5 - 5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5. (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5 - 6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5 - 6.5.
Lipolytic	Lipase A	Experimental	Hydrolysis of fats to glycerin and fatty acids. pH range 5 - 7.
Lactase	Lactase A	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1 - 7.5.

Commercially available Rohm & Haas enzymes are being used *now* in the following industries:—Fruit juices, jellies and fruit juice concentrates, protein hydrolysates, baking, corn starch industries, fermentation. Have you stopped to think how these materials might improve your product or manufacturing process?

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Sodium Fluosilicate—Uses in Food Industry

A means for saving industry several hundred million dollars each year by eliminating damage caused by rats to packaged foods and other products has been suggested by Clifford A. Hampel, supervisor of inorganic technology at Armour Research Foundation of Illinois Institute of Technology.

Some estimates place the annual loss to industry caused by rats at more than a billion dollars, Hampel said. Warehousers assume that they will suffer an average loss of 15 percent of the value of stored articles through damage caused by rats.

Hampel believes that sodium fluosilicate, properly coated on the outer surface of paperboard shipping cartons, would be an effective rat repellent. He also suggests that it might be applied in the glue lines of the paperboard, or incorporated in the paperboard itself at the time of manufacture of the chip layer and liner sheets.

Critical studies to evaluate these possibilities are now being carried on with the aid of Dr. James B. DeWitt, U. S. Fish and Wildlife Service, Patuxent Research Refuge, Maryland.

"Sodium fluosilicate incorporated in food in very small quantities has caused rats to refuse the food over a four-day test period," Hampel said.

The chemical has the advantage of being an irritant and repellent to warm-blooded animals, even in small quantities, but has not been considered a dangerous poison, Hampel said.

He pointed out that before World War I it was used as a food preservative in Europe. Such use is prohibited by the Food and Drug Administration in this country. The compound actually is less toxic to warm-blooded animals than most of the common economic poisons, he said.

Hampel points out that potential production of sodium fluosoilicate, a by-product of the phosphate industry, is much greater than present consumption. This fact caused him to become interested in possible uses for this "overlooked and neglected chemical," which he says was "passed by in the development of new chemicals and novel processes."

Chief use of the chemical at the present time is as a "sour" to neutralize alkalinity in the final rinse water at commercial laundries (much as lemon juice is used in rinsing the hair). Small quantities are used as a flux in the metals and ceramics industries, and in some insecticides.

Hampel said that his studies have pointed up several other possible uses for sodium fluosilicate. He believes the chemical, or compounds including it, will be the answer to the question of how to stop dry-rot fungus in building materials made from the coniferous timbers, chiefly the type of fungus prevalent in the Gulf Coast and Pacific Northwest regions. More than 1¼ million tons of insulating board are made from these timbers each year.

Sodium fluosilicate, he believes, could be used as an effective weed killer; to defoliate cotton plants (kill the leaves and cause them to fall off) in preparing them for the picking machine; to sterilize the soil in preparation for planting certain plants, chiefly tobacco; as an insecticide in the control of weevils, cutworms, and other pests including even cockroaches, the housefly, and the moth.

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News of the Institute

(Continued from page 14)

COUNCIL EXECUTIVE COMMITTEE

Dr. Carl R. Fellers, President of the Institute of Food Technologists, announced the election of the following Councilors to the Council Executive Committee of the Institute:

W. L. Campbell—Massachusetts Institute of Technology, Cambridge, Massachusetts
B. S. Clark—American Can Company, Chicago, Illinois
H. T. Griswold—Owens-Illinois Glass Company, San Francisco, California
W. D. Pheteplace—Pfaudler Company, Rochester, New York
Geo. F. Steward—Iowa State College, Ames, Iowa

Alternates:

R. B. Wakefield—Gerber Products Company, Fremont, Michigan
E. E. Meschter—American Preserve Company, Philadelphia, Pennsylvania

The Executive Committee is scheduled to meet in Chicago, October 30, 1949, where Colonel Charles S. Lawrence plans to open the national offices of the Institute at 222 West Adams Street, Chicago, on October 1, 1949.

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Selected Abstracts

ANALYTICAL METHODS

315I. Measurement of egg yolk color by means of the colorimeter.

MAYFIELD, H. L., AND HALBROOK, E. R. *Poultry Sci., 28,* 462-4 (1949).

An objective method is presented for the comparative analysis of the color of egg yolk, using acetone as the extracting fluid and a photoelectric colorimeter for the measurement.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

316I. Structure of acorn starch.

HIRST, E. L., JONES, J. K. N., AND ROUDIER, A. J. *J. Chem. Soc.,* 1779-83 (1948).

This starch contains 80% of amylopectin. The acetyl and methyl derivatives have high viscosities and molecular weights. Several methods are given for determining the proportion of terminal to non-terminal glucose residues. A method for methylated amylose in methylated amylopectin as well as applications of the periodate oxidation procedure to structure proof are also given.

317I. The amylose component of waxy maise starch.

BOURNE, E. J., AND PEAT, S. *J. Chem. Soc.,* 5-9 (1949).

Waxy maise starch and the starches from other waxy cereals (rice, barley, and sorghum) are usually regarded as being composed entirely of amylopectin. Although no amylose could be obtained from waxy maise starch by the thymol or *cyclo*hexanol precipitation, a fraction with an enriched proportion of amylose, which was similar in properties to potato starch was isolated after fractionation of the starch with aluminum hydroxide. When thymol (or *cyclo*hexanol) was used in conjunction with sulphuric acid, fractions approximate in properties to the amylose component of potato starch were isolated. The proportion of amylose thus found in waxy maise starch is not more than 2%.

318I. Distribution of labeled carbon in plant sugars after a short period of photosynthesis in $C^{14}O_2$.

GIBBS, M. *J. Biol. Chem., 179,* 499-50 (1949).

The distribution of C^{14} in the sugar molecules formed by growing barley and canna in an atmosphere of $C^{14}O_2$ is given. The mono-and di-saccharides were degraded after recovery, and the distribution of C^{14} on carbons 1, 6; 2, 5; and 3, 4 are given. Radioactive rat liver glycogen is quite different in its distribution.

319I. The secretion of radioactive calcium (Ca^{45}) in the hen's egg.

DRIGGERS, J. C., AND COMAR, C. L. *Poultry Sci., 28,* 420-4 (1949).

A method for the measurement of Ca^{45} in egg yolks, whites and shells as well as blood and bone is described. It was estimated that from 60 to 75% of the calcium in an egg is secured directly from the diet. Appreciable quantities of ingested radioactive calcium were found in the hen's blood and bones after 21 days of heavy production.

320I. Phosphoglucomutase II. Mechanism of action.

JAGANNATHAN, V., AND LUCK, J. M. *J. Biol. Chem., 179,* 569-75 (1949).

Phosphoglucomutase contains non-dialyzable phosphorus. When the enzyme acted on glucose-l-phosphate labeled with P^{32}, the enzyme became radioactive, while the specific activity of the ester P decreased. The observed values for the subsequent radioactivity of enzyme and glucose esters correspond with those calculated on the hypothesis that an exchange between enzyme P and substrate P takes place. The radioactivity of the enzyme could not be removed by dialysis, but after reaction with an excess of non-labeled glucose-l-phosphate, the enzyme lost its radioactivity on dialysis. After denaturation by iodine the radioactivity of the enzyme was not removed by a similar treatment. The evidence strongly suggests an exchange between enzyme P and substrate P. The implications of such an exchange are discussed.

(Continued on page 4)

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Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

Abstracts

(Continued from page 2)

321I. Inactivation of amino acids by autoclaving.

EVANS, R. J., AND BUTTS, H. A. *Science, 109,* 561-71 (1949).

At least three types of reaction are involved in the inactivation of amino acids by prolonged autoclaving of a sucrose containing food or feed, such as soybean oil meal. Lysine, aspartic, and glutamic acids combine with some constituents of the protein, probably the free carboxyl with the free amino groups, to form enzyme-resistant linkages. The amino acids with free amino groups react with sucrose to destroy the amino acids. Protein-bound methionine, cystine and histidine with sucrose form linkages resistant to enzymatic hydrolysis *in vitro.*

322I. Foam fractionation procedures in the isolation of fruit proteins.

DAVIS, S. G., FELLERS, C. R., AND ESSELEN, W. B. JR. *Food Tech., 3,* 198-201 (1949).

Application of foam fractionation procedures provided a highly satisfactory method for fractionating the protein complex from extracts of apple tissue. Analysis of the complex showed it to consist of a number of protein systems closely combined with a phlobaphene or similar tannin-like compound. The complex possessed certain solubility characteristics which indicated that the capillary activity of the material may be dependent on particular groupings in the protein molecule. Foam fractionation procedures may provide highly practical methods not only for isolation of traces of material in solution or suspension, but also for purification of certain mixtures in which undesirable substances are capillary active or may be made capillary active.

323I. Growth-depressing fractions in raw beans.

KLOSE, A. A. et al. *Arch. Biochem., 22,* 215-23 (1949).

A growth inhibitory protein function similar in gross effect to that of soy bean was isolated from lima beans. Steam heating markedly increased the growth promoting quality of the lima bean, optimum conditions for processing being similar to those for the soy bean.

324I. Analysis of the essential structural features of DDT by a study of the toxicity of closely related compounds to roaches and to houseflies.

PICARD, J. P., AND KEARNS, C. W. *Canadian J. Res., 27D,* 59-67 (1949).

Three series of compounds have been prepared and compared for the insecticidal activities against German roaches and houseflies. The substituted *2, 2-* diphenyltrichloroethanes and substituted benzohydrols have been found to have comparable activities on roaches. The substituted *2, 2*-diphenyltrichloroethanes alone had insecticidal properties against houseflies. The benzophenone derivatives were ineffective against both groups of insects.

MICROBIOLOGY

325I. Rumen bacteria in cobalt-deficient sheep.

GALL, L. S. et al. *Science, 109,* 468-9 (1949).

In cobalt deficiency, marked alterations occur in the types and numbers of bacteria in ruminants, and these bacteriological changes are not caused by lowered feed intake of the deficient animals.

326I. Making liquid carbohydrate-rich foods resistant to microorganisms.

COLEMAN, G. H., AND WOLF, P. A. Assignors to The Dow Chemical Company, *2,474,226,* June *28,* 1949.

The method of imparting to a fruit juice an increased resistance to attack by microorganisms which comprises dissolving in such a minor but effective amount of a compound selected from the class consisting of dehydroacetic acid and its sodium potassium, ammonium and calcium salts.

327I. Making carbohydrate foods resistant to microorganisms.

COLEMAN, G. H., AND WOLF, P. A. Assignors to The Dow Chemical Company, *2,474,227,* June 21, 1949.

The method of imparting to foods rich in carbohydrates an increased resistance to attack by microorganisms which comprises bringing into contact with such foods a compound selected from the class consisting of dehydroacetic acid and its sodium, potassium, ammonium and calcium salts.

328I. Influence of the amino acid-dextrose reaction on growth of lactic acid bacteria.

ROSE, D., AND PETERSON, R. *Canadian J. Res., 27B,* 428-36 (1949).

Growth of *Lactobacillus arabinosus, L. casei,* and *Streptococcus faccalis* (as measured by lactic acid production) was studied in relation to the effects of the products of the amino acid—reducing sugar (Maillard) reaction. Addition of preformed Maillard products to a medium had little or no effect. Medium that had been autoclaved after the addition of dextrose promoted more rapid growth (shorter lag phase) than medium for which the dextrose had been autoclaved separately. This effect could not be traced to the presence of Maillard products, but appeared to be a complex phenomenon depending in part on the *Eh* of the solution. Destruction of amino nitirogen occurred during autoclaving and destruction of tryptophan was evident from a comparison of growth response curves. It is concluded that the Maillard reaction affects the growth of these organisms only when an essential amino acid (or other nutrient), present in limiting quantities, is destroyed by the reaction. A serious error may be introduced into microbiological assays for amino acids if the samples to be assayed contain dextrose.

329I. The production of antibiotics by soil microorganisms.

BRIAN, P. W. *Chem. and Ind.,* No. 25, 391-2 (1949).

The production of antibiotics is common to all kinds of soil microorganisms, and these antibiotics have varied biological and chemical properties. Soil bacteria known to produce antibiotics fall into two groups, spore-forming bacilli and fluorescent pseudomonads. The former group produce antibiotics which show great specificity and are polypeptides, while the latter group produce antibiotics of general toxicity, and are highly coloured phenazine derivatives. The chemistry of antibiotics produced by actinomycetes and fungi is still relatively unknown, but their toxicity has been studied.

NUTRITION

330I. Relative cost of nutrients in a serving of food.

ROLLINS, M. Ithaca, N. Y. Agri. Expt. Sta. *Bull No. 845* (1948).

Since vitamins A and C tend to be found in foods that do not supply many other nutrients cheaply, these dietary essentials need to be planned for, and the cheap sources kept in mind for a low-cost diet. Homemakers who wish to supply an adequate diet cheaply to their families might well emphasize the use of the following foods; white potatoes, whole wheat bread, rolled oats, beef liver, pig liver, pea beans, rutabagas, carrots by the pound, spinach, and milk, fresh and canned. Servings of the food providing nutrients cheaply may not provide large quantities of the nutrients. Larger and more frequent servings of these foods may offer a way to better nutrition at low cost.

331I. The use of Rosa canina for the preparation of vitamin-rich foods.

LA PAROLA, G., AND PRUNER, G. *Ann. Chim. appl. Roma, 35,* 148-60 (1945); *Nutr. Abst. Rev. 18,* 790, No. 4423 (1949).

Analyses were made on 4 varietieis of wild rose hips for the content of ash, fatty acids and vitamin C. The ascorbic acid content in mg. per 100 g. ranged from 540 to 685 for the whole fruit, from 920 to 1140 for the fresh pulp and from 2085 to 2561 for the dried pulp. A table of vitamin C values for some common foods is given to illustrate the high content in rose hips and their value as a possible addition to other foods.

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Abstracts

(Continued from page 4)

332I. Nutritive value of common salt.

MHASKAR, K. S. *J. Indian Med. Assoc., 17,* 120-7 (1948); *Nutr. Abst. Rev., 18,* 403, No. 2323 (1948).

The role of salt in nutrition is reviewed. Indian salt obtained by evaporation of sea water in open pans is stated to have the following % composition: NaCl 87.90, $MgCl_2$ 4.29, $MgSO_4$ 2.67, $CaSO_4$ 1.76, the residue being insoluble matter and unidentified impurities. It is considered that ¾ oz. daily of this impure salt is a safe allowance for an adult vegetarian under Indian conditions, and that no harm is likely to result from the presence of the Ca and Mg salts.

333I. Xanthopterin in animal nutrition.

Nutr. Revs., 7, 131-3 (1949).

A review of recent work on xanthopterin indicates that it may be the "active" form of folic acid. An optimum concentration of xanthopterin (mg. per kg. body weight) injected into anemic rats caused an immediate spectacular rise in red cell count, reticulocyte count, white cell count, hematocrit and hemoglobin concentration, whereas the increase in these values after injection with folic acid was delayed as much as 3 to 5 days. Higher concentrations of xanthopterin were not as effective, and in normal non-anemic rats, xanthopterin injections proved to produce polycythemia and leucocytosis.

334I. The utilization of lactose by the mature fowl.

COUCH, J. R., et al. *J. Nutr., 38,* 105-13 (1949).

Laying hens fed a purified diet with lactose as the carbohydrate, ceased laying in one to two weeks after being placed on the diet. 30% fat in the diet corrected the deleterious effect of lactose on egg production. High levels of lactose appeared not to effect hatchability.

335I. The effect of fish meal and extracts of fish meal on hatchability of hens' eggs and growth of progeny.

PENSACK, J. M., BETHKE, R. M., AND KENNARD, D. C. *Poultry Sci., 28,* 398-405 (1949).

Two experiments with hens showed that a diet of yellow corn, oats, wheat by-products, dehydrated alfalfa meal, soybean oil meal (expeller), minerals, and adequate vitamins A, D, and riboflavin, is deficient in a factor essential for good hatchability. The essential hatchabality factor was present in sardine fish meal and was soluble in 80% hot ethanol and was adsorbed by Darco G-60 at pH 3.0 from a water solution of an ethanol extract of fish meal, but was not adsorbed at pH 3.0 from an 80% ethanol solution of a similar extract. Sardine fish contains a growth factor(s) which is transmitted from the hen through the egg to the chick.

FOOD PRODUCTS

CEREALS, GRAINS AND BAKERY PRODUCTS

336I. Collaborative analysis of wheat, oats, and barley for thiamine and riboflavin.

SPENCER, E. Y., et al. *Canadian J. Res., 27F,* 194-8 (1949).

In the analysis of wheat, oats, and barley for thiamin and riboflavin by three collaborating laboratories, an attempt was made to reduce interlaboratory differences to a minimum by the establishment of a standardized procedure. The thiochrome and fluorometric methods were used for the thiamin and riboflavin determinations respectively. It was apparent that even after steps had been taken to standardize the assay procedures, small but consistent and significant interlaboratory errors existed. Calculations indicate that differences of the order of 10 to 12% in mean assay values were necessary before samples could be considered different with respect to their thiamin or riboflavin content.

337I. Effect of heat treatment of separated milk on the physical and baking properties of doughs enriched with dry milk solids.

LARSEN, R. A., JENNESS, R., AND GEDDES, W. F. *Cereal Chem., 26,* 189-200 (1949).

The three major components of nonfat dry milk solids, casein, lactose, and the milk serum proteins, were heated in solution for 30 minutes at 70° C., 75° C., and 80° C., and incorporated into doughs in amounts equivalent to the addition of 6% of non-fat milk solids. The unheated fractions all depressed loaf volume with lactose having the greatest effect. In the absence of potassium bromate, heat treatment improved the baking quality of the milk serum proteins considerably, but had no effect on the baking behavior of casein or lactose. Inclusion of bromate in the baking formula increased the loaf volume when unheated milk serum proteins were added to doughs; bromate also somewhat improved the baking results with lactose.

DEHYDRATED FOODS

338I. Mashed potato powder. IV. Deterioration due to oxidative changes.

J. Soc. Chem. Ind., 68, 149-51 (1949).

The off flavor in mashed potato powder is probably due to oxidative rancidity of the potato fat. This flavor is different from that caused by "browning."

339I. Deterioration of dried fruits.

HAAS, V. A., AND STADTMAN, E. R. *Ind. and Eng. Chem., 41,* 983-5 (1949).

Ion exchange resins have been used to separate apricot concentrates into three fractions of distinctly different composition: a cation fraction containing 81% of the nitrogenous constituents and all of the inorganic cations, a neutral fraction containing 98% of the sugars, and an anion fraction containing 88% of the acids other than amino acids and acidic proteins. The browning of apricot concentrate was compared with the browning of the individual fractions and with combinations of these fractions. These experiments indicate that browning is the result of at least four types of reactions; between the nitrogenous constituents and the sugars, between the nitrogenous constituents and organic acids, between sugars and organic acids, and reactions involving only organic acids.

POULTRY AND EGGS

340I. Vitamin and amino acid content of processed chicken meat products.

MILLARES, R., AND FELLERS, C. R. *Food Res., 14,* 131-43 (1949).

Studies on the effect of processing on the thiamin, riboflavin, and nicotinic acid content of chicken meat indicate that significant losses of thiamin occur with all methods of processing, losses being a function of both the time and temperature of the process. Curing and smoking, followed by canning, resulted in losses of thiamin which may exceed 80% of the original content of this vitamin in fresh chicken meats. Curing and smoking were also found to cause notable losses of nicotinic acid, but no appreciable loss of this vitamin resulted from other methods of processing. No significant loss of riboflavin occurred as a result of any of the processes. Little destruction of amino acids was noted to occur during commercial processing of chicken meat products, with only tryptophan showing significant losses. As much as 50% of this amino acid may be lost in the canning of chicken meat.

341I. Frozen storage of poultry. V. Effects of some processing factors on quality.

PEARCE, J. A., AND LAVERS, C. G. *Canadian J. Res., 27F,* 253-65 (1949).

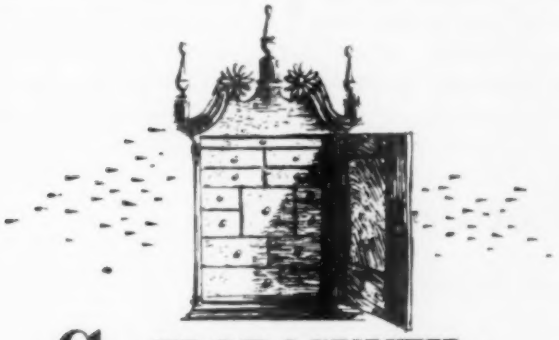
Examination of a number of phases of poultry processing showed that birds of optimum quality were obtained by: using a 90 second bleeding time; dipping in a semi-scald tank for 40 seconds at 128° F.; operating both shafts of the rough-plucker

at the same speeds; operating the rough-plucker at conditions such that the rubber fingers did not exert a force greater than 11 lb. on the carcass; and carefully training operators of hand-roughers. Splitting the carcasses up the back, eviscerating, and packing flat reduced the space required for packing to less than 50% of that required by present methods, and still permitted reassembly of the bird into a presentable form for roasting. An impact dynamometer was useful in detecting unfrozen spots in the birds. Injecting various solutions into the carcass before freezing, and measuring the drip from the defrosted muscle, showed that maintaining the proper ratio of salts and water in the muscle reduced drip. Bleeding time had no effect on development of off-odors in stored poultry but evisceration before storage markedly reduced development of off-odor on the eviscerated surface and in the thigh meat. Coating eviscerated birds before freezing with carrageenin gel containing 6% NaCl delayed development of off-odor on eviscerated surfaces of defrosted carcasses.

342I. Preparing and storing frozen eggs.

WINTER, A. R. *Ice and Refrig., 116,* 64, June, 1949.

Quality in frozen liquid egg products is determined largely by bacterial content, which in turn is affected by (a) cleanliness and soundness of original eggs, (b) sanitation and speed of handling into freezers in breaking plants, and (c) methods of freezing and storage. When liquid egg products arrive at freezing plants or at storage plants, after freezing, they may be already sufficiently contaminated so that the best practices cannot protect them fully. Freezing must be fast and thorough and should follow quickly after eggs are broken out. There is no sure way of knowing whether various lots will tolerate small or large deviations from best freezing and storage practices. Keep freezing temperature at 0° F. or below, preferably with forced air movement. Store at 0° F. or below.



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343I. Studies on preservation of shell eggs by coating with plastics.

YUSHOK, W. D., AND ROMANOFF, A. L. *Food Res., 14,* 113--22 (1949).

Newly laid eggs coated with films of chlorinated rubber, polystyrene, or polyvinyl acetate lose substantially less CO_2 and water during storage than untreated eggs. Ability of chlorinated rubber and polystyrene to preserve fresh eggs is improved by inclusion of either dibutyl phthalate or n-butyl stearate in the plastic solutions. The preservative value of these plasticized resins is somewhat increased by small amounts of petrolatum and microcryst. wax. Inclusion of cetyl pyridinium chloride, an effective inhibitor of mold growth, does not decrease the sealing ability of plastic coatings. Plastic films, which are non-toxic, tasteless, and odorless, can be formed on eggs by a simple dipping or spraying method, without the use of elaborate equipment. Cost of the plastic material and modifiers is not prohibitive for practical use.

TASTE TESTING

344I. Organoleptic tests in the food industry. III. Some statistical considerations in organoleptic tests.

WOOD, E. C. *J. Soc. Chem. Ind., 68,* 128-31 (1949).

The principles underlying the correct interpretation of the judgments of Tasting Panels are discussed with special reference to the use of an analysis of variance. Certain assumptions inherent in present methods for assigning palatability scores are examined critically. There is some risk of erroneous conclusions when a series of scores, each for one desirable quality, is to be combined to obtain a single score for general palatability; suggestions are made for improving the correlation between such scores and consumers' actual verdicts.

345I. Genetical differences in taste sensitivity to phenylthiourea and to anti-thyroid substances.

HARRIS, H., AND KALMUS, H. *Nature, 163,* 878-9 (1949).

There is a high correlation between taste sensitivity for phenylthiourea, symmetrical diphenylthiourea, thiourea, thioglyoxaline and thiouracil. There was no such correlation between sensitivity to these substances and to urea, phenylurea and uracil. Thus, substances so far tested, to which the genetically distinct types of individuals respond differently, all contain the grouping $=N-\overset{\overset{\|}{S}}{C}-$

GRADUATE FOOD COURSES AT I. I. T.

The Graduate School of the Illinois Institute of Technology is presenting two lecture courses of interest to Food Technologists, starting September 21, 1949 and continuing through January 25, 1950. Sixteen lectures are scheduled in each course.

A course in Food Acceptability Technics, directed by Colonel Rohland A. Isker, is designed to provide the student with (1) a working understanding of the methods used in evaluating public acceptance of food products, (2) a review of industrial practices in evaluating commercial indices, and (3) an appreciation of steps being taken to put theory into practice. The list of lecturers includes the most outstanding names of the country on the subject of organoleptic grading of foods.

A course on Food Regulation and Compliance is directed by Albert I. Kegan, Counselor at Law and Lecturer in Patents and Copyrights, Northwestern University. The lectures include subjects on patents as well as on food standards and regulation.

Food Technology Traffic Rules

After brief reflection it is easy to agree with the conclusion that, taking one consideration with another, an editor's lot, like a policeman's, is not a happy one. An editor is indeed a kind of literary traffic cop who not only enforces decisions but is often called upon to make them. One can hardly blame him, therefore, for soliciting the advice of a cabinet of associate editors to guide him in formulating editorial policy.

The IFT is composed of members representing many phases of professional and technological interest, from the purely academic to the frankly commercial. As the official organ of the Institute, FOOD TECHNOLOGY must satisfy the needs of its members. What shall be the guiding philosophy in setting the standards for publication? It would seem logical that this philosophy should reflect the fundamental aim of the Institute to advance and achieve recognition for food technology as a profession. Thus original papers on scientific or technological topics should be required to be new and significant. Obvious or subtle ax-grinding should be directed to advertising or to publications in which there is no question as to the propriety of such practice.

The use of trade names for products identifiable by their description or by their "common or usual" names is unseemly in a professional publication except in rare cases when it is essential for accuracy of presentation or to facilitate duplication of an experiment; in no case should trade names be used when comparing competitive products for merit or for the exploitation of one of several competitive products. The use of such statements as "Patent Pending" which may confer commercial advantage but which are difficult to verify independently sometimes poses a ticklish question of editorial policy. The professional journal must avoid such a reference except in the unusual case in which the reference is necessary to clarify a scientific or a technical point.

Most publications disavow responsibility for the statements and opinions of their contributors, but this policy evades the issue of competitive advantage.

Editorial policies are not easy to enforce. Many members of IFT are employed by companies who expect them to participate in the technical promotion of their products. Perhaps it should be more difficult than it is to obtain time on a meeting program for the presentation of promotional papers, but it certainly should not follow that such contributors necessarily merit space in a scientific publication. It is the Editor's job to decide where to draw the line—and an unenviable one it is, for good policy is not always good politics.

As the window dressing for the IFT, the pages of this publication should display high quality of content, attractively presented. It is devoutly to be wished that all papers published in FOOD TECHNOLOGY be characterized by accuracy, originality, clarity, vitality, essentiality and brevity. Too often, however, scientists and technologists in our laboratories and plants whose work merits publication lack the facility for describing their accomplishments in a manner fitting these characteristics.

It is the Editor's unhappy lot to balance such elements as content against style; novelty against self-aggrandizement; prolixity against authorship. As one seated on the pedestal of the throne of responsibility, I can say for our Editor, "It's a tough job, but you, dear writer, can help make it easier."

B. L. OSER.

Notes and Letters

Letter to the Editor

Several months ago, J. C. Ayres reported "A Procedure for the Quantitative Estimation of Salmonella in Dried Egg Products" (FOOD TECHNOLOGY, May, 1949, pp. 172-176). In this paper he intimates that the method used by us to estimate these organisms (*Canadian Journal of Research*, F22: 46-63, 1944: Ibid. F25:291-298, 1947; *Poultry Science*, 25:115-117, 1946) is quite complicated, whereas it is actually much simpler than the one he proposes. I believe the difficulty was that he has included in the method some remarks on differentiating Salmonella colonies on the plates from various contaminants found in egg products which we had not intended to be included in the quantitative method itself. Perhaps our original paper was not too clear on this point and to prevent further confusion it is hoped you will be able to publish the following details:

The method used as a routine procedure in these laboratories is as follows: 13 gm. of egg powder is ground with 117 ml. of tetrathionate broth in a sterile mortar with a small amount of sand or mixed in a sterile screw-capped aluminum Waring blendor jar. This gives a sufficient quantity of a 1-10 dilution for ten tubes each of 10.0, 1.0 and 0.1 ml. amounts of the inoculated broth (1.0, 0.1 and 0.01 gm. of powder). Two or three ml. of tetrathionate broth is added to tubes containing the 0.1 ml. amounts to prevent drying. After 24 hr. incubation at 37° C. the tubes are streaked on SS or bismuth sulphite agar plates, usually two tubes to a plate, and the plates are incubated overnight at 37° C. Typical colonies are then checked with O-sera by the slide agglutination method. From the number of tubes positive for Salmonella the most probable number per gram of powder can be determined by the published tables. Using the dilutions suggested covers the range from less than one to 180 organisms per gram.

In our experience the majority of the Salmonella in egg powder are in Groups C and B. We have therefore found that by checking with sera 04, 02, 05 and 06 in that order we were able to group most of the organisms with the greatest economy of sera and time.

(Notes and Letters continued on page 16 following technical papers)

Industrial and Legal Viewpoints

Introduce Your Engineer to a Food Technologist[a]

E. E. SMITH

Plant Engineer, Valley Date Gardens, Indio, California

The problem of combining sanitary control with operating efficiency in small plants is discussed. The sanitizing of belt conveyors in dried fruit handling is cited as an illustration of the importance for effective cooperation of food technologists with practical production engineers.

This is a paper designed to approach some of the engineering and sanitation problems of smaller food processing plants which, because of their highly specialized product and limited volumes, do not enjoy the same attention from machinery manufacturers as those which are engaged in the manufacture of more staple articles. The limited possibility for sales of machinery and equipment to smaller processors naturally means that the large machinery plants cannot be depended upon to furnish all necessary equipment. Standard type machines must be revised to meet special problems and in the majority of cases, the engineer must use his ingenuity in building equipment which meets the requirements of his product. As a consequence, it is not unusual to find that the sanitation angle is overlooked in the quest for cheaper means of expediting the product through the plant.

In larger, more standard operations, machinery and equipment manufacturers are able to design more or less standard machinery and the volume is such that they are able to employ technical men who can explore all angles of efficiency in a machine before it is in the production stage. This, unfortunately, is not true in the smaller industries, and too often the trial and error method must be used. This does not always produce the best "under the surface" results. As a result, it is found that a great deal of good thought and planning has gone into the equipment but that one item which has been overlooked in the construction is the sanitation problem.

It has been generally accepted that a reduction of the microbiological population on food processing machinery and equipment must command ever increasing attention in the development of new methods and processes for handling and packaging of non-sterilized food products. It is a matter of record that, rather than reducing these organisms, handling of dried foods to the ultimate packaging of the product, tends to build them up. This increase of micro-organisms is aggravated by the use of conveyor belts and equipment on which there is a continual build-up of syrups and other debris and by physical handling of the product without sufficient attention to sanitation of the hands. Lug boxes, trays, and sweat boxes also tend to aggravate this condition unless adequate cleaning is undertaken.

[a] Presented before the Ninth Annual I. F. T. Convention, San Francisco, Calif., July 14, 1949.

The engineering problem in the food plant thus becomes two-fold.

First, how to adapt the present equipment to this new program without costly replacement of otherwise satisfactory operation.

Second, to plan a program which will take into consideration microbiological build up, and so design any future machinery and equipment that ease of cleaning as well as continuous sanitization may be effected, insofar as possible.

Not too long ago a conveyor was merely what the name implies; a method of moving a product from one operation to another, or of providing a space where inspection and grading could be accomplished while the product moved from one point to another.

In recent years, it has been found necessary to go far beyond this point in the building of food plant equipment and machinery. The old-time practical engineer, through no fault of his own, has not been conscious of the importance of plant sanitation and cleanliness. He has had little concept of the bacterial build-up on what otherwise were very good conveying and inspection belts. In fact, the natural reaction has been one of extreme impatience and distrust of the food chemist who had the temerity to suggest that his equipment was lacking in one of the most important details so needed in the modern plant, that of sanitation. His first duty was to provide a cheaper and faster means of moving his product through the plant. This he accomplished by the use of Head and Tail Roll lightly held together by a piece of angle iron on each side, which supported the bearings. This he mounted on other angles to provide the proper heighth from the floor, thus providing a cheaper and faster way of moving his product through the plant.

The above mentioned two rollers and endless belt system was by its very nature of simplicity at least accessible in most part. Shortly thereafter, he is confronted by the safety engineer who can show that unless the major "nip points"are covered he will have a very unsafe piece of machinery which will endanger life and limb. It becomes necessary for him to add guards to eliminate danger points and soon he has a belt which is inaccessible for cleaning except on exposed surfaces. As a result, there are a series of idler rollers and slip points bounded on each side by side rails wide enough to hide all said rollers, plus a head roll at one end and a tail roll at the other, producing a beautiful incubator which cannot be cleaned until the belt is removed. Of course, with the addition of a few chain guards and other necessary material we have, at least, been able to satisfy the safety engineer. But it is a nice piece of equipment and the engineer is justly proud of his handiwork.

Perhaps he was not aware of the bacteriological growth that took place in these inaccessible places, and until he is made aware of the importance of doing something about it, he cannot be blamed too much for his lack of interest in the subject.

This is the time he should be introduced to the food chemist. It is important that this acquaintanceship be one of mutual trust and confidence in order to produce practical equipment which will meet the standards of the various inspectors who must be satisfied with its cleanliness, as well as those who rule on its safety.

Now, admittedly, in too many cases, we have built a grading belt, or conveyor, which meets the requirements of the safety code. We also, as above mentioned, have a built-in bacterial incubator. What can be done with it?

1. Depend on a thorough cleaning after each shift, which is good but does not prevent a heavy build up during the operational day.

2. Use of intermittent wiping with chlorine treated cloths, which if carried on at regular intervals, is very effective, but requires that the belt be put out of operation during the wiping periods.

3. Use of continuous washers and sterilizers which keeps the belts free from excessive loads of food debris and micro-organisms throughout the period of operation and materially assists in the clean-up at the end of the day.

There are two general types of continuous sterilizers in use in our plant.

1. The immersion type.

2. The revolving brush washer.

The immersion type sterilizer consists of a pan a few inches longer than the width of the belt in use and slightly wider than the diameter of the tail roller. There is a hugger roll just forward of the tail roll which keeps the belt travel high around the tail roll, thus allowing for submergence in the rectangular pan. A squeegee is placed in sharp contact with the belt moving over the tail roll. The pan is supported by a simple set of hinged brackets with knock out braces which allows the pan to be removed for cleaning.

The revolving brush washer consists of a brush, the width of the belt, which is mounted on bearings secured to the conveyor frame in such a manner as to bring the brush into sharp contact with the surface of the belt. Immediately following the brush, a squeegee is placed in such a manner as to wipe the moisture from the belt and to allow it to run back into the same pan in which the brush is revolving in contact with the solution. It is necessary to arrange a motor drive or a series of gears or sprockets and chains to drive the brush so that it revolves in the opposite direction of the belt travel.

The first, or immersion type, has several advantages over the brush washer.

The cost of power, additional equipment and design becomes a factor, for the brush washer requires a motor or other drive to control the revolutions of the brush. Upkeep and depreciation are other factors which do not favor the brush type washer.

In comparison, the design, construction, upkeep and depreciation of the immersion type washer are most simple.

Another advantage which is related directly to sanitation strongly favors the immersion type of belt washer. It is almost impossible to keep the revolving brush clean and free from contaminating food debris and micro-organisms. Obviously, such a condition then completely nullifies any desirable effect which otherwise might be obtained.

An advantage of the immersion type washer which may be discounted by some is that it can be operated with a small amount of water, treated in any manner without requiring expensive dispensing apparatus. This is a distinct advantage for the smaller food plants and not without merit even for the larger plants where water consumption and disposal problems are acute.

In operation, the required treatment of the water and the frequency of change have been observed to depend upon the purpose which the belt washer must accomplish. If the sole requirement is that the belt be clean and free from unsightly accumulations of food debris and other foreign matter, fresh water or, at most, a detergent treatment of the water is all that is required. If, however, the belt must be kept relatively free from micro-organisms, as is the case in most instances, a sanitizing agent must be used. (See Reference).

In practice it has been found that in a great many cases, especially when handling syrupy or sticky material, it is possible to manipulate the material by shears or other devices in such a manner that dividing of flow becomes much simpler on a continually washed belt than on one which is cleaned by any other method. This, in many cases may have a decided economical advantage for the operator, which will more than offset any mechanical objections to the installation.

In planning for building of new grading belts, washers, sterilizers, packaging lines, etc., primary consideration should be given to the dollar value to be returned by the use of the equipment but we should not lose sight of the possibility of the clean up time using up the greater portion of dollars saved. I recently observed a machine designed for one man operation, but practice proved that the take down and cleaning operation required as much time as the average operating day. This was primarily because of the placing of one vital part which would not permit the use of steam or water wash down without dismantling. This problem will be overcome and no doubt the clean up time will be very materially lessened, thus making the machine practical from an operational standpoint.

It would seem advisable to construct conveyors, grading equipment, and washers, wherever practicable, in such a manner as to provide a definite opening between the food contact surface of the belt and the return so that they can be readily steamed or washed on both sides without the necessity of removing and replacing the belts. This also makes possible the cleaning of auxiliary rollers, idlers and side rails. This is not always possible because of the problem of maintaining knee room for operators and graders, but has proven practical in a large number of operations. It is often possible to use the return section of the belt as a means of trans-

porting or assembling culls, pits or other by-products to a central point, thus saving the cost of another belt as well as saving space.

These are the observations of conditions which are prevalent in smaller food plants where the product is highly specialized and where the engineering is often done by practical men. An industry which has sprung from the small farm packing houses and is still experiencing growing pains on the road to becoming a grown up industry, and a few correcting procedures which we are using to overcome some of our handicaps.

LITERATURE CITED

1. Vaughn, Reese H., Winter, Frank, and Smith, Edward E. Continuous sanitizing of equipment in the dried fruit industry. *Food Technol.*, 2, 292 (1948).

ABSTRACTS OF VITAMIN LITERATURE

To the Editor's desk has come a copy of Volume II, No. 4 of "Abstracts of Vitamin Literature," a quarterly publication of the Association of Vitamin Chemists, Inc. This publication, after two years of operation primarily for members of the Association, is now being offered for general distribution. The issue mentioned above contains 30 mimeographed pages of Abstracts covering a broad field of vitamin literature. Fifty-seven Journals are regularly abstracted. The publication is issued in October, January, April, and July. The annual subscription rate is $3.00. Subscriptions are received by Mr. Irwin Olcott, Dawe's Vitamin Oil Products, 4800 South Richmond, Chicago 32, Illinois.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS

An extensive list of technical papers and three engineering conferences on specialized problems of the refrigeration industry are expected to produce a record turn out for the 45th Annual Meeting of the American Society of Refrigerating Engineers at Chicago's Edgewater Beach Hotel December 4 to 7.

The inclusion of the three conferences in addition to the regular four technical sessions at the ASRE meeting will provide one of the most diversified and popular programs in many years. These conferences are (1) the household refrigerator conference at which the use of plastics will be discussed; (2) a water re-use symposium concentrating on means for conserving water used in refrigeration and air conditioning; and (3) a conference on the design and applicability in multi-room buildings of room air conditioners.

In each of these conferences, a paper on the general subject will be read by an outstanding authority in the field and then leaders from many refrigeration firms will be asked to discuss the salient points brought up in the paper.

Twelve technical papers will be given at four plenary sessions of the Society.

Two meetings of the Society's governing council are scheduled as well as many meetings of technical committees now at work on new and revised codes and standards for rating and testing refrigeration equipment.

Book Review

Practical Canning, by Arthur Lock. Food Trade Press, Ltd., London, 1949, 246 pages. 40 shillings ($5.60).

Although writing for the British reader, the author has drawn upon an acquaintance with canning practice in the United States, which he has generally interpreted quite soundly. Nevertheless, the American reader is apt to conclude that the book was written for someone else; some of it deals with products or styles of pack unfamiliar to him, and in many places it suffers from the brevity of treatment inevitable in covering so large a subject in so small a space. For example, the canning of pineapple occupies but a page and a half. Some few products, notably peas and beans, are given a little more space.

Attention is limited to canned fruit and vegetable products; meats, fish, milk and specialties are not included, unless jams, applesauce and beans with pork are regarded as specialties. Of the thirteen chapters, six are devoted to subjects of general application, such as starting a cannery, organization of operations, can sealing, sirup making, retort operation, etc. The remainder cover fruit and vegetable canning, manufacture of fruit pulp (sulfured for jam making), jam canning, and glass packing ("bottling") of fruit. The section on jam is nebulous as to formulation; much more detailed information would be required in order to operate in compliance with the standards of identity in effect in this country. Fruit bottling is treated briefly, the author indicating that glass packing has thus far had limited adoption by British firms. Only three lines of text are devoted to the retorting of glass containers with supplementary air pressure.

In his Introduction the author shows himself aware of the difficulties of describing an industry in which practices vary so widely from one plant to another. A more serious difficulty arises from the changes that occur with time; one can never catch up fast enough to get into type. In Chapter XII, for example, the steam exhausting of vegetables before closure is stressed, even for peas which in this country are generally closed without exhaust. Yet there has been a marked trend toward vacuum and steam-flow closures in recent years, specifically to eliminate the space-wasting exhaust boxes recommended here. It is perhaps no reflection on books of this type to say that no canner could afford to place sole reliance on them, but must constantly seek the latest information from trade publications, fellow canners, machinery and supply manufacturers, and in fact from every available source.

Within the severe limitations of space the author has acquitted himself well, arranging his material logically and expressing it clearly. A few errors or ambiguities were found, as on page 23, where the heights of No. 2 and No. 10 cans were given $\frac{1}{16}$ inch too short. The book is printed on good paper, showing to advantage the 52 well-chosen illustrations of British canning equipment, and has an index.

C. A. Greenleaf.

News of the Institute

PRESCOTT AND STATELER TO WRITE IFT HISTORY

Dr. Samuel C. Prescott, emeritus professor and former Dean of Science of Massachusetts Institute of Technology as well as the first president of the Institute of Food Technologists, is presently engaged in writing a history of the IFT. He is being assisted in this work by Mr. E. S. Stateler, associate editor of *Food Industries* and a past chairman of the Chicago Section of IFT.

Dr. Prescott, generally recognized as the "father of food technology," was responsible for the first Food Technology Conference held at MIT in 1937. This conference, coming 15 years after "Boston Tech" first offered a course in food technology under his leadership, provided the nucleus of food experts who founded the Institute of Food Technologists in another meeting at MIT in 1939.

Preliminary to this meeting was a meeting of a small group of food technologists at the New York Agricultural Experiment Station in Geneva, called by Dr. George J. Hucker, and a second meeting of the same group in New York City, at which committees were chosen to implement the organization activities. The first annual conference of the Institute was held in Chicago in 1940.

Dr. Prescott will outline the factors and forces that led to the realization of his dream for recognition of food technology as a profession. The ever increasing reliance of the world's oldest and largest business—the processing, handling, and distribution of food—upon science and its applications has been emphasized and firmly established by the nation's experiences in the two World Wars of the 20th Century, not to mention the general public's preferences for processed and prepared foods.

The Chicago Section of the Institute established the Nicholas Appert Medal Award for presentation to outstanding food technologists — which award was conferred upon Dr. Prescott in 1943 as its second recipient. In its desire to commemorate the tenth annual IFT conference, the officers and executive committee of this first chartered regional section decided that a history of the Institute would prove a fitting tribute to its rapid growth from a membership of approximately 700 to nearly 3000 in its first ten years of existence, and especially so, under the authorship of IFT's official "father," Dr. Prescott.

Mr. Stateler, who was one of the founders of the Chicago Section, has long been a staunch advocate and loyal supporter of the Institute as evidenced by his many services to the national society as chairman of most of its important standing committees.

Thus Prescott and Stateler have been commissioned to prepare an authentic record of the Institute of Food Technologists and its Chicago Section to be published in a brochure for presentation to all who attend the IFT Decennial Conference to be held in Chicago in May, 1950.

EDITORIAL BOARD MEETING

At a meeting of the Editorial Board of FOOD TECHNOLOGY held in San Francisco, California, on July 10, 1949, decisions were made that will be of interest to I. F. T. members in general. In the absence of the editor, Dr. B. E. Proctor presided.

A Committee of Associate Editors was appointed to prepare a statement of policy in regard to the subsidizing of the publication of manuscripts, and to investigate the cost of such subsidizing. This committee consists of: W. H. Cathcart (New York), E. M. Mrak (California), and P. C. Wilbur (California).

The policy under which FOOD TECHNOLOGY operates concerning sequence of publications is to publish papers in the order in which they are accepted and not necessarily in the order in which they are received. The order of receipt of papers is followed insofar as possible, but the time elapsing before acceptance varies so widely that it is impossible to publish the papers strictly in order of their receipt. It was decided that the date of the initial receipt of a paper be published with the paper.

On December 31, 1949, the Editorial Board will, with regret, bid au revoir to six of the present Associate Editors and on January 1, 1950, will welcome six new Associate Editors. At the July meeting of the Editorial Board, the names of all Associate Editors were placed in gelatine capsules in a cup, and six capsules were then drawn from the cup. The following names were drawn for those whose tenure of office ends in 1949:

W. H. Cathcart
H. C. Diehl
L. S. McClung
E. M. Mrak
B. E. Proctor
P. C. Wilbur

A further drawing was then made, to determine by lot those whose tenure of office would end in 1950. The following names were drawn:

H. W. Dorn
C. N. Frey
W. H. Goss
H. A. Schuette
P. F. Sharp
H. W. von Loesecke

It was decided to form immediately an Editorial Policy Committee consisting of nine Associate Editors and the Editor-in-Chief. The nine Associate Editors will consist of three of the six whose tenure of office ends in 1949, three of the six whose tenure ends in 1950, and three of the six whose tenure ends in 1951. On January 1, 1950, three of the six newly appointed Associate Editors will also be appointed to the Committee on Editorial Policy.

Efforts are to be made to group the papers published in any one issue of FOOD TECHNOLOGY to give diversification, so that not too many papers on the same subject will be printed in one issue.

The Editor and the Executive Committee of the Council were authorized to review a suggested method of reducing publication costs by presenting the News of

the Institute and Book Reviews in a separate mimeographed publication. It was suggested that consideration be given to the format of the first two pages of FOOD TECHNOLOGY, for the purpose of conserving space. For example, it is believed unnecessary to list all officers of the Institute in every issue of the journal. Once or twice a year might suffice.

It was decided that the abstracts are an important part of FOOD TECHNOLOGY, because many receive this publication who do not receive CHEMICAL ABSTRACTS. Hence it was recommended that the abstracts be continued. It was not deemed practical, however, to publish the abstracts so that they could be cut out and filed.

It was decided that if charts have to be redrawn, this should be done at the author's expense and not at the expense of FOOD TECHNOLOGY.

A telegram was sent to the Editor, Dr. C. Olin Ball, who was unable to be present at the meeting. This telegram expressed the pleasure and appreciation of the Associate Editors of working with Dr. Ball and congratulated him on his splendid accomplishment in raising FOOD TECHNOLOGY to its present high standing in the field of food technology.

ANNOUNCEMENT OF 1950 I. F. T. PROGRAM COMMITTEE

The Program Committee for the 1950 I. F. T. Conference to be held at the Edgewater Beach Hotel in Chicago, May, 1950, has been organized. The Committee is composed of the following members:

Lloyd A Hall, National Program Chairman
Vice Chairmen:
Industrial and Production Section—John H. Nair, Ray Wakefield.
Research Section—George F. Stewart, Louis B. Howard.
Symposia—Emil M. Mrak, Bernard L. Oser.

A preliminary meeting of the National Program Committee was held at Atlantic City during the A.C.S. Convention on September 19. At this meeting, Dr. Fellers, National President of I. F. T. was present, as was Dr. Clifcorn, Chairman of the Exhibits Committee.

Any members who wish to submit papers for the 1950 Conference are requested to advise immediately the National Program Chairman or a member of the Program Committee.

COUNCIL MEETING, INSTITUTE OF FOOD TECHNOLOGISTS

July 9, 1949, Palace Hotel, San Francisco

Thirty-nine Councilors signed the register. The meeting was called to order at 9:30 A.M. by President H. C. Diehl.

Several actions previously recommended by the Executive Committee on May 15, 1949, were approved. The main items in connection with FOOD TECHNOLOGY are:

1. The Editorial Board shall consist of nine (9) members plus the Editor. Three (3) of the nine (9) members shall be rotated each year, giving a 3-year term.

2. The Editor is urged to make full use of the Editorial Board to function effectively on all matters of debatable editorial policy and in the general conduct of all editorial functions.

3. The personnel of the Editorial Board shall be approved annually by the Council or by its Executive Committee.

4. The Publications Committee is concerned with the business management of FOOD TECHNOLOGY, including final approval of all advertising.

5. Efforts will be made to conserve the space used for editorials, book reviews and regional section news in order to provide additional space for contributed papers.

6. Papers given at Annual Conferences shall be available first of all to the Editor of FOOD TECHNOLOGY who shall promptly decide which are suitable for the Journal. Others shall be released promptly to the authors.

7. The subject matter of Annual Conference papers may be rewritten for other publication objectives and printed in other journals provided prior notice is given by the author to the Editor of FOOD TECHNOLOGY. The Editor has the right to release such papers.

8. It is not the policy of the National Institute to claim publication rights for papers presented before Regional Sections. The latter are free to make their own rules on this matter.

9. The contracts with Harley Ward as Advertising Manager and with Garrard Press for printing of the Journal were approved for not more than one year from July 1, 1949.

10. The printing of 3200 copies of the journal beginning with July 1949 issue was approved.

Other recommendations made by the Executive Committee were approved as follows:

1. Each Regional Section will determine the Councilors who will represent it at Council meetings. Councilors-at-large hold office concurrently with officers, but for a 2-year term.

2. An Institute Employment Committee was authorized with a representative from each Regional Section.

3. Authorization was not given to publishing the revised Constitution in FOOD TECHNOLOGY. Mimeographed copies will be supplied for the present.

4. Student membership annual dues shall be $2.50.

5. The questionnaire for the I. F. T. Membership which was prepared by the Committee on Liaison with the Armed Forces was approved.

Voted that Proceedings of the Annual Conference be no longer published.

The reports of the Secretary-Treasurer and President were accepted. Highlights of the Secretary's report were that present membership numbers 2905 with 242 nonmember subscribers to FOOD TECHNOLOGY. A new directory was prepared and mailed to the membership in May 1949. The balance of funds on hand June 30, 1949 was $20,675.00 plus a $1000 U. S. Government Bond. Estimated expenses for the period July 1-December 31, 1949 are $12,550 with estimated income at $6,225.00 exclusive of possible increased income from advertising and from Annual Conference receipts. The financial standing of the Institute is sound but the greatest care is recommended in keeping down expenses.

Voted that all National Committee Reports be duplicated 15 days in advance of the Annual Conference so that copies shall be available to Councilors before the Annual Meeting. Committee Chairmen are responsible for duplicating their reports or mailing them to the Executive Secretary's office in time for him to duplicate them and mail to Councilors.

Report of the Finance and Budget Committee was approved. The budget estimate for FOOD TECHNOLOGY is $16,080; Secretary's office $10,500 and President's Office $800. Estimated income is $29,400 not including profit from the Annual Conference in San Francisco. Members dues are estimated to net about $20,000.

The Committee on Constitution reported that all recommended revisions in the Constitution had been voted by the membership. The Constitution is available in mimeo form. Copies may be had from the Executive Secretary. It was voted not to print the revised Constitution in FOOD TECHNOLOGY. The Committee felt that the Constitution should be further liberalized and freely interpreted. Changes in By-laws would be preferable in the future rather than further revision of the Constitution. The report was accepted and the next committee on Constitution was instructed to implement the recommendations made in the present report.

The reports of Committees on Publicity, Nominations, National Conference, Program, Insignia and Membership Certificate, and Qualifications were accepted with thanks. The Committee on Insignia and Membership Certificate was discharged. The Committee on Membership is preparing a descriptive brochure on the Institute.

Allocation of funds for various committees was discussed and it was voted to refer to the Executive Committee.

The report of the Committee on Education and Curriculum was approved. This committee proposes to distribute a questionnaire to the food industries (I. F. T. and non-members) together with an explanatory covering letter.

The Report of the Committee for Liaison with the Armed Forces together with the attached questionnaire was approved. Request for an MOS number (military occupational specialty) for food technologists in the Army was disapproved by Army Authorities.

The Council voted that all National Committee Chairmen furnish succeeding Chairmen with old Committee Reports and files.

The Report of the Committee on Regional Sections was approved. The Council recommended that meetings for Section and Club officers be made an annual event at the Annual Conference. The purpose of such a meeting is to strengthen the organizational structure of local sections by round table discussions of problems and how they have been solved in local areas. (Note: The Breakfast held on July 10 was most successful and stimulating and it was voted to hold another meeting at Chicago in 1950). The Council directed the new Committee to study boundaries of existing Regional Sections.

Dr. Fred C. Blanck, Liaison Representative of the I. F. T. on the Food and Nutrition Board of the National Research Council, is a member of the Food Protection Committee which deals with nutritional and public health aspects of the addition of chemicals to foods. A permanent Committee on this subject is being set up by the Food and Nutrition Board of the NRC. Dr. Blanck's report was approved.

The Council approved the report of the Committee on Student Membership with the exception that dues for student membership were set at $2.50 per year. This includes receipt of FOOD TECHNOLOGY and the right to register at the Annual Conference for a fee of $1.00. Student Chapters may now be activated at various Universities by complying with the newly revised Section of the Constitution dealing with Student Memberships.

President Diehl reported briefly on the work of several technical committees of the Institute. These are Pectin Standards; Chemicals in Foods; Procedure and Nomenclature in Taste Testing; Frozen Foods; and Microbiology of Citrus Products. It was the general feeling of the Council that such technical committees should be sponsored and encouraged.

President Diehl reported that the I. F. T. had been accepted by the AAAS as an Affiliated Society, and is now entitled to appoint two Councilors to the AAAS. It was voted that the incoming President appoint two Councilors (which may include the President) to represent the Institute at the AAAS.

The Editor's report was read and accepted except for the matter of a budget which was referred to the Budget Committee.

It was voted that the name of the Iowa Regional Section be changed to Ames Regional Section. This was done at the request of the Section itself.

It was voted to accept the petitions of the Ohio Valley and Oregon for new Regional Sections.

Col. Charles S. Lawrence was appointed by the Council to serve as Executive Secretary and Business Manager of the Institute for the period October 1, 1949 to December 31, 1950 at an annual salary of $4800. The address of the Executive Secretary is 222 West Adams Street, Chicago 6, Illinois.

Garrard Press was continued as publisher of FOOD TECHNOLOGY for one year, i.e. June 30, 1950. Similarly C. O. Ball was reappointed Editor of FOOD TECHNOLOGY for the same period. Harley Ward was reappointed Advertising Manager for FOOD TECHNOLOGY, the year ending June 30, 1950. It was the feeling of the Council that the Publications Committee should make recommendations to the Council regarding appointments of the Editor, Editorial Board, Advertising Manager and Publisher, in the future (no motion).

Philip K. Bates was duly elected Secretary-Treasurer of the Institute for one year.

The matter of incorporation and/or other means of protecting the Institute, the Executive Secretary and membership, was referred to the Executive Committee.

The matter of depositaries for funds of the Institute was referred to the Executive Committee.

It was voted that President Fellers carry on the duties of Secretary-Treasurer, pro tem until such time as the office of the Executive Secretary could be set up in Chicago.

The Executive Committe was directed to study the matter of continuity of exhibits at Annual Meetings. How do exhibits affect the value and financial aspects of Annual Conferences? An attempt should be made to define a long-term policy concerning the scientific program and exhibits. Should advertisers in FOOD TECHNOLOGY be given preference in selling exhibit space?

Charles Smith of Chicago reported briefly on the Annual Conference to be held on May 21-26, 1950 at the Edgewater Beach Hotel, Chicago, Illinois. Space is available for about 45 exhibits compared with 100 at San Francisco.

Stephen Galvin of New York stated that the 1951 Conference would be held at the Hotel New Yorker in New York City during the third week of June 1951.

Ray Wakefield of Michigan formally invited the Institute to hold its Annual Conference in the Great Lakes area, probably at Mackinac Island, in June 1952. The Council voted to accept the invitation.

The matter of sustaining memberships in the Institute was discussed and finally referred to the Executive Committee for later action.

It was voted to mail a copy of the Constitution to each new member of the Institute.

Voted to accept Australian and Scandinavian (or Swedish) petition for affiliation with the I. F. T. on the same basis as Regional Sections in the U. S. or Canada, and described in the Constitution. However, these two Regional Sections are accepted on the basis of their present membership in the hope that new members will be attracted to them.

On a show of hands the vote was evenly divided as to whether one National Councilor should represent 100 or 200 members in Regional Sections containing more than 100 members. No action was taken by the Council.

It was voted that at least ten (10) eligible councilors for the Executive Committe of 5 members, exclusive of Institute officers, be nominated by a nominating Committee, and elected by mail ballot. (Note: President-Elect Paul Sharp was selected as Chairman of the Nominating Committee and the election was duly carried out.) President Fellers appointed Lloyd Hall and Milton E. Parker both of Chicago, Program and Publicity directors, respectively.

Meeting adjourned 5:30 P. M.

CARL R. FELLERS
Secretary-Treasurer

INSTITUTE OF FOOD TECHNOLOGISTS ANNUAL GENERAL BUSINESS MEETING

Hotel Whitcomb, San Francisco
July 12, 1949, 12:45 P. M.

PRESIDENT H. C. DIEHL, Presiding

President H. C. Diehl reviewed the accomplishments of the Institute during the past year. He introduced Dr. Carl R. Fellers, the newly elected President, Dr. Paul F. Sharp, President-Elect, Philip K. Bates, Secretary-Treasurer, and Col. Charles S. Lawrence, Executive Secretary. Various members of the local Convention Committee were also introduced. Secretary-Treasurer Fellers read the Secretary's and Treasurer's reports. Philip K. Bates, Chairman of the Finance Committee, read his report and also recommended adoption of a proposed budget. (All reports are presented in the minutes of the Council). Each newly elected officer made a short response.

President Diehl spoke briefly on the function of technical committees. He felt that for the present there should be no sub-divisions or sections in the Institute dealing with different subjects, such as frozen foods, citrus products, fisheries, etc. These groups should function as technical committees.

It was moved and seconded that the edited minutes of the Council Meeting should be published in FOOD TECHNOLOGY. The motion was adopted.

It was moved and seconded that the Committee on Chemicals in Food be authorized to contact, in the name of the Institute, Dr. Wilson of the American Medical Association with the recommendation that activities of various groups in this field be coordinated. The motion was discussed from the floor and adopted. It was also suggested from the floor (but not adopted) that the committee cooperate with the National Research Council, U. S. Food and Drug Administration and the various manufacturers of insecticides.

Meeting adjourned at 1:45 P. M. after President Diehl had thanked all members of various Institute Committees, local Convention Committee and all others for their assistance and support during the year.

CARL R. FELLERS
Secretary-Treasurer

Regional Section News

SOUTHERN CALIFORNIA SECTION

On September 14, the Southern California Section held a dinner meeting at the Rodger Young Auditorium. Mr. R. W. Majonnier of the Majonnier Corporation and Mr. C. A. Shapiro of the York Corporation presented an interesting discussion on "Heat Transfer Media and Equipment," with particular emphasis on the Majonnier Corporation's "Lo Temp" Evaporator as applied to the manufacture of frozen orange juice concentrate. Following the talks, Mr. W. C. Platt of the Damerel-Allison Company (who have a "Lo Temp" unit in operation) led an interesting discussion.

In addition to the officers listed in the July issue of FOOD TECHNOLOGY as having been elected for the 1949-1950 season, the following members have also been elected:

Alternate Section Councilor: J. Pardieck, California Vegetable Concentrates, Inc., 2067 Clarendon Ave., Huntington Park, Calif.

Executive Committee: Franklin H. Hunsicker, Continental Can Co., 3820 Union Pacific Ave., Los Angeles, Calif.; Gordon L. Merchant, Merck & Co., Inc., 1855 Industrial Street, Los Angeles, Calif.

Auditing Committee: E. W. Hawkes (Chairman), Hyland Stanford Corporation, 658 Mesquit St., Los Angeles 21, Calif.

Arrangements Committee: George Wilkenson (Chairman), G. W. Gooch Laboratory, 2580 E. 8th St., Los Angeles, Calif.

Annual Conference Committee: Harry J. Deuel (Chairman),

Department of Biochemistry, University of Southern California, Los Angeles, Calif.

Employment Committee: Roy M. Hagan (Chairman), California Consumers Corp., 230 W. Jefferson Blvd., Los Angeles 7, Calif.

Entertainment Committee: Chester W. Lindsay (Chairman), Exchange Orange Products Co., 616 E. Grove St., Ontario, Calif.

Hospitality Committee: P. James Rich (Chairman), 1105 E. Greenleaf Drive, Compton, Calif.

Intersectional Affairs Committee: James S. Lawless (Chairman), Frosted Fruit Products, 200 Center St., Los Angeles 12, Calif.

Membership Committee: George Cunningham (Chairman), Nopco Chemical Co., 3499 San Pasqual Street, Pasadena 10, Calif.

Nominating Committee: Arthur N. Prater (Chairman), Gentry Inc., 837 North Spring St., Los Angeles 12, Calif.

Publicity Committee (Co-Chairmen): J. Raymond Lindquist, Rexall Drug Co., 8480 Beverly Blvd., Los Angeles 36, Calif.; Randall G. Rice, U. S. Department of Agriculture, 263 South Chester Ave., Pasadena 5, Calif.

Program Committee: F. Leslie Hart (Chairman), U. S. Food and Drug Administration, 1401 South Hope St., Los Angeles, Calif.

Budget Committee: Margaret G. Morehouse (Chairman), Department of Biochemistry, University of Southern California, Los Angeles, Calif.

The address of the Chairman of the Southern California Section, Dr. Louis B. Rockland, is as follows: U. S. Department of Agriculture, 263 South Chester Ave., Pasadena 5, Calif.

Dr. P. James Rich has resigned as Director of Research from Mission Dry Corporation to accept a special research assignment with Gentry Inc.

Dr. Arthur N. Prater, of Gentry Inc., has been appointed Chairman of the Research Committee for the American Spice Trade Association.

NORTHEAST SECTION

The following officers will serve the Northeast Section for the year 1949-1950:

Chairman: Ernest C. Crocker, Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass.

Vice-Chairman: Newton R. Cole, Walter Baker & Co., Division General Foods, Dorchester, Mass.

Secretary: J. J. Austin, Austin Industries, Sudbury, Mass.

Treasurer: Loren B. Sjöstrom, Arthur D. Little Co., 30 Memorial Drive, Cambridge 42, Mass.

Representative National Council for 2 years: William B. Esselen, Jr., Department of Food Technology, University of Massachusetts, Amherst, Mass.

Members of Executive Committee for 2 years: Robert S. Harris, Department of Food Technology, Massachusetts Institute of Technology, Cambridge 39, Mass.; John M. Milne, Brigham's Inc., Boston, Mass.

The complete roster of the Executive Committee for 1949-1950 will be the above named individuals and, also, the present National Councilor, Michel P. Vucassovich, whose term carries over for one year.

The first meeting of the 1949-1950 season was a dinner meeting, held on October 6 at the Women's Educational and Industrial Union, Boston. Mr. L. W. Johnson, Manager of Quality Control, United Farmer's Cooperative, Morrisville, Vermont, spoke on the "Problems of the New England Milk Industry, particularly Those of the Cooperative." Three recently released, short films on the "Distribution and Consumption of Foods" were also shown.

WESTERN NEW YORK SECTION

On October 8, the Western New York Section met at Cornell University, Ithaca, New York, for an afternoon and dinner program. At the afternoon meeting Mr. John Fix, Research Representative of the American Can Co., Rochester, N. Y., presided, and the following topics were discussed.

I. F. T. Membership. Dr. George J. Hucker, Professor of Bacteriology, New York State Agricultural Experiment Station, Geneva, N. Y.

Soil Resources and the Food Production Potentials of the United States. Dr. Richard Bradfield, Head of Department and Professor of Soil Technology, Cornell University, Ithaca, N. Y.

Insecticides and Food Production. Dr. W. A. Rawlins, Professor of Entomology, Cornell University, Ithaca, N. Y.

Opportunities in the Food Industry for Technically Trained Personnel. Dr. J. C. Mauer, Director of Research, National Dairy Research Laboratories, Inc., Oakdale, Long Island, N. Y.; Mr. Henry L. Page, General Manager, Producers-Canners Cooperative, Inc., North Collins, N. Y.

Following dinner, members heard a talk by Dr. B. L. Herrington, Professor of Dairy Chemistry, Cornell University, Ithaca, N. Y., on the topic "Some Notes of a Traveler."

Mr. Thomas G. Tolman, formerly Production Manager for Henry and Henry Co. of Buffalo, will take up new duties at J. Hungerford Smith Co., Rochester, New York. His new title is Technical Director and Laboratory Manager.

Notes and Letters

(Continued from page 8, preceding technical papers)

Identification by O-sera is usually sufficient but further tests can be made as needed. Occasionally it is necessary to make subcultures for serological or biochemical tests. We have found that *S. pullorum* is often missed on SS agar but it usually grows well on bismuth sulphite agar. Non-motile cultures which agglutinate with 06 serum are considered *S. pullorum*.

The amounts of powder or other egg products can be adjusted to meet the needs of the investigation. We have dispersed whole cakes and omelets in one or two liter amounts of tetrathionate broth and dispensed appropriate aliquots to check the survival of Salmonella. However, the method of identification and enumeration is the same. The various operations take very little time and the estimate is usually available on the second day. We think the method is much simpler than that proposed by Ayres.

N. E. Gibbons
Bacteriologist, Food Investigations,
National Research Council, Ottawa, Canada

"THERE'S NO PRACTICAL WAY TO IMPROVE OUR BEEF STEW..."

said a well-known food processor—and his entire technical staff!

YET NOW—

CONVINCED BY THIS ACTUAL CONSUMER TEST—HE IS IMPROVING IT... WITH A BIT OF AC'CENT!

He made this test!

562 families were each given samples of *two* batches of this manufacturer's beef stew, identical in every respect except for the addition of a small amount of Ac'cent in the processing of one. The cans were marked with code numbers, and the housewife was told to serve *both* at the same meal, on separate plates . . . then ask every member of her family, "Which do you prefer?"

1131 of these people (out of 1995) preferred the stew with Ac'cent! Here was the *consumer's* answer to the manufacturer's assertion that his product was "as good as we can make it commercially."

At no obligation to you, we will welcome the opportunity to demonstrate what Ac'cent can do in *one of your own foods* . . . to pay the entire cost of a test run in your plant, including payment for the materials used! Our food technologists will conduct the test. *You* be the judge.

Ac'cent is not a flavoring, not a condiment. It adds no flavor, aroma or color of its own. It simply, but wonderfully, brings out—and *holds*—the *natural* flavors of foods. With Ac'cent, you use your own formulas; you prepare and cook as usual—just *add* Ac'cent.

Wire or phone for first-hand, accurate, full information. Let us discuss with you the possibility of Ac'cent in foods you pack.

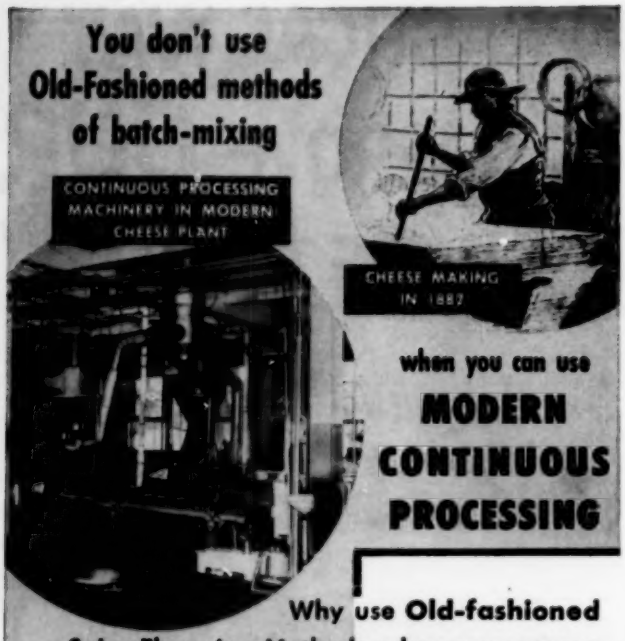
Ac'cent is a 99+% pure monosodium glutamate derived from vegetable sources. It is a wholesome product of Nature. In 100 and 200 lb. drums.

Amino Products Division
International Minerals & Chemical Corp.,
General Offices: 20 N. Wacker Drive
Chicago 6, Illinois

Ac'cent® makes food flavors sing!

Trade Mark "Ac'cent" Reg. U.S. Pat. Off. Printed in U.S.A.

You don't use Old-Fashioned methods of batch-mixing



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Selected Abstracts

ANALYTICAL METHODS

346I. A critical study of the reactions of cations. I. Nickel.

PELTIER, S., DUVAL, T., AND DUVAL, C. *Anal. Chim. Acta, 2,* 301-6 (1948). (In French).

After an examination of the spot tests suggested for the cation nickel between 1937 and 1947, the particular use of the dioxime of 1:2-cyclo-hexanedione, known commercially under the name nioxime, was recommended.

347I. A critical study of the reactions of cations. II. Cobalt.

DUVAL, T., AND DUVAL, C. *Anal. Chim. Acta, 2,* 307-10 (1948). (In French).

The reactions proposed for cobalt between 1937 and 1947 have been critically examined. The reaction of cobalt with sodium thiosulfate in which there is no interference from iron, copper, or nickel is particularly recommended.

348I. The detection of chloride in the presence of hypochlorite and chlorate.

LOEB, N., et al. *Anal. Chim. Acta, 2,* 316-20 (1948). (In French).

The method has been developed for determining the chloride anion with $AgNO_3$ in presence of the hypochlorite, chlorite and chlorate anions. The chlorate anion does not interfere with the determination. In the presence of chlorite anions, the figures for Cl^- are too low in acid media. Hypochlorite is determined separately by arsenite titration. Then, after quantitative reduction of the hypochlorite to Cl^-, the total chloride is determined with $AgNO_3$.

349I. Recent progress in the chemical estimation of ascorbic acid.

GERO, E. *Ann. Nutrit. Alimentation, 2,* 159-78 (1948); *Nutr. Abst. Rev., 18,* 784, No. 4392 (1949).

This paper gives details of new methods of estimating ascorbic acid including the indophenolxylene technic of Robinson and Stotz, the use of bacterial suspensions, the dinitrophenylhydrazine method of Roe and Kuether, and various other improvements and modifications of titration methods.

350I. Oxidation of vanillin to vanillic acid. Significance to determination of vanillin.

ENGLIS, D. T., AND MANCHESTER, M. *Anal. Chem., 21,* 591-3 (1949).

By means of ultraviolet absorption studies, it is shown that a dilute solution of vanillin in air is slowly oxidized to vanillic acid. Ethyl vanillin shows the same type of change. This change is responsible for low results when either of the vanillins is determined by a direct ultraviolet examination. Confirmation is also given for the high results by the official Folin-Denis colorimetric method following atmospheric oxidation. Fairly complete oxidation of the vanillin compounds by air requires several weeks for the very dilute aqueous solution at room temperature. Neither coumarin nor vanillic acid shows appreciable change under the same conditions. Prompt examination is necessary to avoid serious errors in the quantitative estimation of vanillin in flavoring extracts.

BIOLOGICAL SCIENCES

BIOCHEMISTRY

351I. Further studies of the action of pancreatic amylase: Hydrolysis of waxy maize starch.

MINDELL, F. M., AGNEW, A. L., AND CALDWELL, M. L. *J. Am. Chem. Soc., 71,* 1779-81 (1949).

It has been found that the extent of the hydrolysis of waxy maize starch, like that of other starches and their linear components, depends within wide limits upon the concentration of pancreatic amylase. Under comparable conditions and judged by the total reducing values of the reaction mixtures, waxy maize starch is hydrolyzed more slowly by pancreatic amylase than unfractionated corn starch and much more slowly than the

(Continued on page 8)

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1950 MEETING, CHICAGO

See Announcement regarding research papers on page 4.

[a] For the preparation of this index, Food Technology is indebted to Associate Editor Herman W. Dorn.

Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

CALL FOR RESEARCH PAPERS

1950 Institute of Food Technologists Conference

CHICAGO, ILLINOIS . . . MAY 21-25

Because of the success of the research papers sessions at the San Francisco conference, it has been decided to continue this feature at the 1950 meeting. This is the first and final call for contributions for papers to be presented at the research sessions.

Regulations governing the presentation of papers at the research sessions are as follows:

1. *Deadline for Titles and Abstracts.*—Titles and abstracts should be sent in only when the author(s) expects to actually present the paper at the conference. Titles and abstracts must be in before *February 15, 1950.*

2. *Length of Abstracts.*—Abstracts must be limited to 250 words. If longer ones are submitted, they will be shortened by the committee in charge.

3. *Character of Abstract.*—The abstract should be short, concise, but complete. It should outline the problem under investigation and give a brief summary of the results and conclusions.

4. *Manuscript.*—The manuscript should be of such a character as to be acceptable for publication in FOOD TECHNOLOGY. Twenty minutes will be allowed for the presentation at the annual conference. I. F. T. will have first claim on all manuscripts for publication in FOOD TECHNOLOGY. Authors desiring to publish manuscripts elsewhere will be required to secure written permission from the Program Committee. "Suggestions for Authors" may be secured by writing to C. Olin Ball, Editor, Food Technology, Rutgers University, New Brunswick, N. J.

5. *Projection Apparatus, etc.*—If projection apparatus or other special arrangements are needed for the presentation of papers, this information must be provided with the abstract. (See below.)

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(Send to Dr. L. B. Howard, Food Technology Department, University of Illinois, Urbana)

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Proceedings

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News of the Institute

CHICAGO—HOST FOR THE IFT DECENNIAL CONFERENCE

The Chicago Section of the Institute of Food Technologists are hosts to the National Society for the IFT Decennial Conference to be held May 21-25, 1950, at the famed Edgewater Beach Hotel. The first annual conference was held in Chicago in 1940 when IFT had a membership of about 700 food technologists. The Institute has since grown in size to approximately 3,000 members.

In view of the growing influence of food technologists in the continuing development of food and allied industries, it is planned to extend invitations to outstanding leaders in finance and industry for a special luncheon to be followed by a timely and provocative address by an international banker. The purpose for such a gathering is to create a broader appreciation of the significant roles food technologists have already assumed and are prepared to extend in the future development of food industries and the national economy. As a means of emphasizing past and potential capabilities, no technical sessions will be held on Tuesday afternoon May 23 (following the luncheon for their business guests) in order to permit uninterrupted inspection and review of the exhibits by the invited executives, IFT members, and guests.

This special arrangement scheduled for the afternoon of the second day after the opening of exhibits is in recognition of IFT's interest and appreciation for the considerable contribution that their exhibitors make in assuring the continued progress of food processing industries.

Incidentally, the exhibits will be kept open for inspection and personal conferences during the time of any scheduled, technical, or general session from the opening of the program on Monday morning May 22 up until its closing on Thursday afternoon May 25, 1950.

Chairman C. L. Smith of the Chicago Section, IFT, recently announced the committees and personnel for the IFT Decennial Conference. The names of the various chairmen are listed on page 6 of our August issue.

Chairman Lloyd Hall of the Program Committee held a meeting of its members early in October and as a result has projected the following tentative program:

Sunday, May 21, 1950

Council Meeting, 10 A.M.-1 P.M.
Council Luncheon, 1 P.M.-2 P.M.
Council Meeting (cont'd), 2 P.M.-5 P.M.
Committee Meetings, 7:30 P.M.-9:30 P.M.

Monday, May 22, 1950

General Session, 9:30 A.M.-12 P.M.
Babcock Award Luncheon, 12:15 P.M.-1:45 P.M.
Concurrent Sessions, Symposium—Production—Research, 2 P.M.-5 P.M.
Smoker, 8 P.M.

TUESDAY, May 23, 1950

Section Officers' Breakfast, 7:30 A.M.-8:45 A.M.
Concurrent Sessions, Symposium—Production—Research, 9 A.M.-12 P.M.

Edgewater Beach Hotel, Chicago, Home of IFT Decennial Conference.

Luncheon for Business Leaders, 12:15 P.M.-2:15 P.M.
Visit Exhibitors and Personal Conference, 2:15 P.M.-6:00 P.M.
Banquet, Appert Medal Presentation, 7 P.M.

Wednesday, May 24, 1950

Concurrent Sessions, Symposium—Production—Research, 9 A.M.-12 P.M.
IFT Business Meeting and Luncheon, 12:10 P.M.-1:50 P.M.
Concurrent Sessions, Symposium—Production—Research, 2 P.M.-5 P.M.
Steak Dinner and Floor Show, 7 P.M.

Thursday, May 25, 1950

Symposium, "Military Subsistence of the Future," 9 A.M.-12 P.M.
Plant Trips, 1 P.M.

Regional Section News

NORTHERN CALIFORNIA SECTION

On October 6, the Northern California Section heard a talk by Mr. Wayne Ellwood, Manager of the Central Export Department of Food Machinery and Chemical Corporation, San Jose. For a time Mr. Ellwood served as FMCC's representative with the International Machinery Company, with headquarters in Belgium. Mr. Ellwood discussed food processes and food processing plants in Europe and North Africa and also described the organization of Food Technologists in France.

At a meeting of the Executive Committee on October 6, the following were approved for membership in the Northern California Section:

P. W. Alston, Spreckels Sugar.
Joseph Bottini, Calif. Dept. Public Health.
John E. Brekke, Western Regional Research Lab.
Bronson Butler, Duchess Party Foods.
Richard L. Cheney, Glass Container Mfgrs. Institute.
Robert B. Clarfield, California Food & Drug.
Carroll E. Day, Food Machinery & Chemical Corp.
Louis K. Dudak, American Can Co.

(Continued on page 9 following technical papers)

Abstracts

(Continued from page 2)

linear fraction from corn starch. Maltose is present in significant concentrations from the very early stages of the hydrolysis of waxy maize starch by purified pancreatic amylase. Glucose, also, is liberated in the hydrolysis of waxy maize starch by purified maltase-free pancreatic amylase but this sugar is set free in smaller concentrations than maltose and does not appear in the very early stages of the hydrolysis. Waxy maize starch is hydrolyzed rapidly by pancreatic amylase to products of relatively low average molecule weights and of relatively high reducing values. The attack of pancreatic amylase on waxy maize starch appears to be random in the early stages of the hydrolysis, but the accumulation of low molecule weight products in the later stages of the hydrolysis indicates that the action of the amylase is not perfectly random.

352I. On some yeasts isolated from brine.

VERONA, O. *Riv. Italiana Igiene, 8,* 127-41 (1948); *Biol. Abst., 23,* 380, No. 3313 (1949).

Several yeast strains have been isolated from brine of salt-tomatoes. The spoilage of the product is mainly due to *D. guillermondii.* Salt tolerance of every yeast isolated has been tested; the highest tolerance has been shown by *D. tyrocola and D. guilliermondii.* Addition of NaCl to the medium, results in every case in an increase of salt tolerance. Influence of various chemicals as boric acid, salicylic acid and ethyl alcohol upon isolated yeasts has been tested.

NUTRITION

353I. Effect of large-scale methods of preparation on the vitamin content of food.

STREIGHTOFF, F. et al. *J. Am. Diet. Assn., 25,* 687-91 (1949).

Percentage retentions were calculated to express the vitamin content of the cooked product as a percentage of the content of the related raw material. Losses in cooking by each method and differences in vitamin retentions between cooking methods were examined statistically for significance. Raw corn contained per 100 gm.: dry matter, 29.9 (23 to 37) gm.: thiamine, 190 (164 to 227) mcg.; riboflavin, 116 (96 to 133) mcg.; niacin, 1640 (1080 to 2160) mcg.; reduced ascorbic acid, 7.9 (1.3 to 19.2) mg.; and dehydroascorbic acid, 1.25 (.68 to 2.36) mg. Boiled corn retained 102 (86 to 124) % dry matter; 80 (69 to 92) % thiamine; 97 (79 to 120) % riboflavin; 87 (65 to 108) % niacin; and 60 (0 to 106) % reduced ascorbic acid. Holding the boiled corn over boiling water for 1 hour caused no significant losses of any of the nutrients studied. Steamed corn retained 103 (76 to 120) % dry matter; 85 (72 to 94) % thiamine; 101 (95 to 119) % riboflavin; 103 (83 to 117) % niacin; and 62 (2 to 93) % reduced ascorbic acid. Total recovery of vitamins from the boiled corn and the water in which it was cooked was 81, 109, 101, and 61% thiamine, riboflavin, niacin and reduced ascorbic acid respectively. Water from steaming contained less than 1% of the vitamins present in the raw corn. Thus loss of thiamine and ascorbic acid was almost entirely by destruction. Those batches having higher concentrations of ascorbic acid tended to lose, in cooking, larger absolute amounts of ascorbic acid, but lower percentages.

354I. Effect of high-voltage X-rays and cathode rays on vitamins (riboflavin and carotene).

GOLDBLITH, S. A., AND PROCTOR, B. E. *Nucleonics, 5,* 50-8, August, 1949.

Water solutions of riboflavin and petroleum ether solution of carotene have been studied with 3 million volt radiation generated by a Trump generator. This radiation is a potential means of food preservation. Both vitamins were destroyed in varying amounts depending upon the concentration of the solution.

355I. The biological value of corn and wheat proteins in the male infant, with a note on the utilization of D-tryptophan.

ALBANESE, A. A., et al. *J. Nutr., 38,* 215-24 (1949).

It has been found that the nitrogen retention and weight gain of infants maintained on a synethetic diet in which tryptophan- and lysine-supplemented commercial zein constituted the principal source of N, were inferior, by reason of the poor digestibility of the zein, to those obtained on a casein diet fed at the same fluid, caloric distribution and nitrogen levels. A diet in which tryptophan and lysine-reinforced corn gluten provided the major source of protein also proved to be nutritionally inadequate for the infant. In contrast, a lysine-enriched wheat gluten diet supported a nutritional state in the infant comparable to that afforded by evaporated milk formula. There was some evidence that D-tryptophan may have had an untoward nutritional effect.

356I. The synthesis of B vitamins in the horse.

CARROLL, F. D., GOSS, H., AND HOWELL, C. E. *J. Animal Sci., 8,* 290-9 (1949).

Considerable quantities of thiamin, riboflavin, pantothenic acid, nicotinic acid, pyridoxine, folic acid, and biotin are synthesized in the intestinal tract of the horse, the greatest amounts being found in the caecum and large intestine. When fed a B vitamin low-diet, for four months, horses exhibited anorexia, nervousness, incoordination in the hind quarters, loss of weight, and general weakness. Thiamin administration brought about an increase in food consumption, gain in weight, disappearance of incoordination in the hind quarters, decrease in general nervousness, and a lowering of the high pyruvic acid concentration in the blood to the level found in normal horses.

357I. Relative requirement and source of vitamin B_{12} for turkeys and chickens during the later stages of growth.

LILLIE, R. J., et al. *Poultry Sci., 28,* 541-8 (1949).

Beltsville Small White turkey poults reared on wire and slat floors to 20 weeks of age did not grow so rapidly if the 6% of fish meal in their diet was replaced by soybean meal at 8 weeks of age as if it was continued in the diet. Turkeys grew as well if the 6% of fish meal was replaced by meat meal at 8 weeks of age as if they continued to receive fish meal. Growth of turkey poults was retarded if meat meal was fed from hatching time on or if meat meal replaced fish meal at 4 weeks of age. The basal diet contained soybean meal as the sole protein supplement. Experiments with Rhode Island Red baby chicks indicated that meat meal was a less potent source of vitamin B_{12} than was fish meal. Meat meal was an effective supplement, however, when fed as 8% of the diet. The requirement of the turkey poult and of the growing chicken for vitamin B_{12} appears to be less, per unit of feed, during the later than during the early stages of growth.

358I. The growth depression of turkey poults caused by linseed oil meal.

KRATZER, F. H. *Poultry Sci.,* 619-20 (1949).

Turkey poults grew slowly and died when they were fed rations containing from 30 to 47% linseed oil meal. Growth and survival were improved when the linseed oil meal was treated with water or when it was supplemented with pyridoxine, but when water-treated linseed oil meal was fed, supplementation with pyridoxine did not improve growth.

359I. The influence of corn starch upon roughage digestion in cattle.

BURROUGHS, W., et al. *J. Animal Sci., 8,* 271-8 (1949).

A substantial decrease in roughage dry matter digestion was noted when starch was included in the ration in which corncobs or corncobs and limited alfalfa hay made up the roughage part of the ration. This decrease in roughage digestion occurred even though the percent protein in the total ration was widely different. Minor decreases in roughage digestibility were noted in two alfalfa series and no decrease in a third alfalfa series. The variable influence of starch upon roughage digestion can best be explained on the basis of adequate or inadequate nutrients for the growth of microorganisms in the alimentary tract, associated either with starch fermentation or roughage digestion.

(Continued on page 10 following technical papers)

News of the Institute

(Continued from page 7 preceding technical papers)

Stanley J. Hotchner, American Can Co.
Jack B. Jaquith, Pacific Olive Co.
Robert A. Johnson, Golden State Co.
Philip W. Kaufman, Western Crown Cork & Seal.
Basil Knauth, Wilbur Ellis Co.
Henry Libkitz, El Dorado Oil Works.
R. F. Locke, Jr., Hodges Research & Development Co.
Henry E. Lorenzini, California Food & Drug.
H. David Michener, Western Regional Research Lab.
Harry E. Olson, Hills Brothers Co.
Rolie O'Neal, University of California.
Edmond R. Rasnick, Pictsweet Foods, Inc.
Francis Sayre, National Canners Association.
Doris H. Taylor, Western Regional Research Lab.
Carla A. R. Thomas, National Canners Association.

Over 80 new members have joined the Northern California Section this past year.

At this same Executive Committee meeting, a motion was made and approved authorizing the expenditure of about $200 for the purchase of a public address system.

Guests present at the October meeting included:

Frank Gorentz, American Home Foods.
Bob Whitmore, Food Machinery.
Gibson Gray, Workman Pkg. Co.
Bob Gibson, Libby, McNeill & Libby.
Louis Dudak, American Can Co.
Bill Jones, American Home Foods.
Roger Wilson, Continental Can Co.
Allen Mills, Leslie Salt.
Bill Sheal, Libby, McNeill & Libby.
Stanley Hotchner, American Can Co.

Roger Wilson of the Chicago Section, former Chairman, expressed his pleasure at being present at the meeting and extended the greetings of the Chicago Section.

The Section's Annual Meeting, held on December 1 at the Western Regional Research Laboratory at Albany, was an all-day affair as in the past. During the day a program of short research papers was presented. At the dinner meeting in the evening, Mr. W. V. Ellison, Assistant Deputy Regional Director for the Department of Commerce, was the speaker. His talk was entitled "Aggressive Selling—the Need of Americans." Program Chairman for the meeting was Ernest Jacobs, of Lyons-Magnus, Inc. Other members of the Program Committee were Charles Stumbo of the Food Machinery and Chemical Corporation, Frank Lamb of the National Canners Association, and Harry Owens of the Western Regional Research Laboratory.

Hugh Griswold, of the Owens-Illinois Glass Company, has been elected to membership on the Council Executive Committee.

John R. Matchett has been transferred from the Western Regional Research Laboratory at Albany, California, to Washington, D. C.

The Illinois Institute of Technology in Chicago has announced a special 16-week course in food acceptability techniques, directed by Colonel Rohland A. Isker. The course began September 21 and runs through January 25. It includes 16 one-week courses by leaders in the food industries east of the Mississippi.

NORTHEAST SECTION

On November 3, the Northeast Section met at the Massachusetts Institute of Technology, where they heard a talk by Dr. Ernest S. Guenther, Vice-President and Chief Research Chemist of Fritzsche Brothers, Inc., New York. Dr. Guenther has spent part of each of the last twenty years visiting the producing areas of the world, conducting "on-the-spot" experiments and taking colored motion pictures of the domestic producing methods in nearly every country of the world. His lecture was on "The Production of Essential Oils in Africa" and was accompanied by a showing of colored motion pictures taken in the field.

Dr. Sidney L. Feener, Jr. (Aberjona Division, General Foods Corporation, Woburn), Dr. Arthur S. Levine (Food Technology Department, University of Massachusetts), and Dr. Samuel A. Goldblith (Department of Food Technology, Massachusetts Institute of Technology) have been appointed to the Membership Committee of the Northeast Section.

SOUTHERN CALIFORNIA SECTION

On October 19, at the Rodger Young Auditorium, the Southern California Section met for a dinner meeting. Subsequently they were addressed by Mr. L. H. Burt, Products Supervisor of the Cellulose Products Department, Hercules Powder Company, Wilmington, Delaware. The subject of Mr. Burt's talk was "Water-Retaining Agents" and covered the applications of water-retaining agents in the food processing industry, with description of the commonly used water-retaining agents and the potentials of products of the future.

At a meeting on September 14, a motion was made by the Executive Committee and passed with unanimous approval to extend an initation to the National I. F. T. to hold its annual meeting in 1954 in Los Angeles. At this same meeting Milton E. Powell of the Knudsen Creamery Company of California discussed the Army Program of the Reserve Officers Research and Development Group. He stated that the Research and Development Sub-group in Pasadena still had openings for a few more members and that some of the I. F. T. members were probably eligible to take advantage of this opportunity.

Harry J. Deuel, Jr., Chairman of the Annual Conference Committee, and Marsden S. Burns are organizing an excellent program for the fourth annual meeting of the Southern California Section, to be held sometime in February 1950 at the Mayfair Hotel in Los Angeles.

Because of the high cost of mailing, the "Proceedings" of the general meeting held last year are to be distributed as nearly as possible at the Section meetings. Copies were ready at the October meeting for distribution in this way.

The Southern California Section is now publishing a "Monthly Bulletin." The first issue of Volume I appeared in September, 1949. It is reported that the bulletin appears to be a financial and "social" success.

(Continued on page 11)

Abstracts

(Continued from page 8 preceding technical papers)

360I. Rachitogenic effect of some green fodders for sheep.

EWER, T. K. *Brit. J. Nutr., 2,* 406-7 (1949).

There is a relationship between a good season, more feed, greater growth by the sheep and high incidence of rickets, and it appears that the quantity of ultra-violet radiation is of less importance than the occurrence of some specific principle interfering with phosphorus metabolism in the growing sheep, found in highest concentration in green cereals.

PHYSIOLOGY

361I. Body builds fat in aging.

MAYER, J. *Sci. N. L. 56,* 51 (1949).

Aging is characterized by a shift in body chemistry toward building up of fat, rather than protein from food. A change in diet on aging is, therefore, indicated, in order to avoid the possible development of degenerative diseases and malignancies. In cancer cells a sudden or progressive reversal from the adult characteristic of fat synthesis to the youthful characteristic of protein building may take place. A glandular shift from growth hormones, as the sex hormones also takes place on aging.

362I. New clot inhibitor.

Chem. Eng. News, 27, 2162 (1949).

The new compound may completely replace heparin for short-term administration in human beings, its anticoagulant action appearing as rapidly and lasting twice as long as that of heparin. It is not yet known if Paritol can be used safely for more than 5 to 7 days. The drug will be made available in two grades, the cruder grade for injection into experimental animals, preserving whole blood, and replacing sodium citrate or magnesium sulfate in manometers in physiological experiments. The highly purified product of controlled particle size range will be offered for therapeutic use as soon as clinical investigations warrant its release.

FOOD PRODUCTS

CEREALS AND GRAINS

363I. Relationship of physical factors to the granulation of flour.

WICHSER, F. W., AND SCHELLENBERGER, J. A. *Northw. Miller Milling Production Section, 238,* 1a, June 14, 1949.

A study was made of the effect on flours due to different methods of preparing wheat for milling. Lengths of tempering time and amounts of tempering water were varied, as well as comparisons made of conditioning wheat vs. cold water tempering. Of these various conditions, none seemed to alter the characteristics of the flours produced from wheat. Mill stream flours were studied also from the standpoint of granulation. While granulations of the break flours remained the same in relation to one another regardless of the commercial mill sampled, the sizing and middling flours did not necessarily follow the interrelation so closely. The study involving the relationship between a normal (or fine) flour granulation and coarse flours produced data with a significant trend in quality characteristics. Both coarse and fine (or normal) flours from the same primary middling source contained the same ash and protein content. The flour extractions were also the same. In every case throughout the baking test, the coarser flours produced significantly superior results. While flour of normal granulation may produce desirable bread, milling a coarser flour from the same material gives a superior bread. This would indicate that flours may have potential quality beyond the limits now recognized.

DOG FOOD

364I. A comparative study of the nutritive value of dry and canned dog foods.

HOPPERT, C. A., AND HART, E. B. *J. Am. Vet. Med. Assoc., 115,* 118-20 (1949).

A report on the nutritive value of dry and canned foods for growth and maintenance. Experimentation conducted over a six month period disclosed that on the basis of consistent gains in weight and general thriftiness, the one brand of dry dog foods tested was equal nutritionally to better of the five brands of canned dog foods tested. One of the canned dog foods tested was found to be totally inadequate, leaving the animals after six months in exceedingly poor condition.

FROZEN FOOD

365I. Storage of frozen milk.

Ice & Refrig., 117, 45 (1949).

Present research progress has shown the necessity of storage at —10° F. for frozen milk products such as frozen whole milk, frozen concentrated skim milk, and frozen concentrated whole milk. Storage period is three to four months, except for frozen concentrated whole milk for which 8 to 10 weeks is the indicated limit. These products are not produced in significant quantities but research and commercial interest is large. Production hazards that would affect storage life include quality of original milk, careful control of temperatures in pasteurization and vacuum concentration, avoidance of copper-contamination, speed of cooling and freezing.

366I. All-aluminum container serves as cooking, freezing utensil.

PACK. *Parade, 17,* 53, Mar., 1949.

Traypak is a low cost pure aluminum tray available in pint and quart sizes. Lids can be applied with a simple manual tool or by semi-automatic machine. Products can be baked, frozen and re-heated in the tray which may be re-used.

FRUIT

367I. Ripeness and color studies with raw and canned peaches.

KRAMER, A., AND HAUT, I. C. *Canning Tr., 72,* 7-8, Aug., 1949.

The data tend to validate, from a physiological standpoint, the assumption that a loss in green pigment is an indication of ripening of peaches, since every delay in harvest causes a substantial reduction in green pigment concentration, as measured by the spectrophotometric and the fluorometric methods. The data also indicate that within the limits of 60 to 88° F., the duration of storage of the raw fruit is more important in ripening than is the temperature of storage, except that the fruit tends to "color up" (more yellow pigment) better at higher storage temperatures. The data further substantiate the fact that the green pigment is more stable, since it is affected almost not at all, while the yellow pigment is decreased considerably as a result of the canning process. The greater apparent increase in green pigment as a result of processing as measured fluorometrically may be partly ascribed to the loss of yellow pigments which mask the fluorescence of the green pigment.

MEAT AND FISH

368I. Simplified test on the freshness of fish meat. (1) An application of Walkiewicz's method for measuring the freshness of whale meat.

AMANO, K., AND UTIYAMA, H. *Nippon Suissan Gaka Kai Shi, 14,* No. 1, 48-50 (1948); *Comm. Fish. Abst., 2,* 11, July, 1949.

A rapid and simple method of measuring the freshness of raw beef, which was introduced by W. Walkiewicz, was applied to fish and whale meat. Procedure: Finely chopped meat, 5.0 g., is suspended in 50 cc. of distilled water and filtered. The amount of 0.1 cc. of the filtrate is added to 3.0 cc. of 1% $HgCl_2$ (solution A) and to acidic $HgCl_2$ (solution B: 1% $HgCl_2$ containing 0.05% of acetic acid). The coagulation, if it happens, indicates the meat not fitted for food. Results of experiments carried out on shipjack and whale meat are shown.

369I. Electronic fish-finder.

EDDY, D. *Sci. N. L., 56,* 74-6 (1949).

By using the Bendix DR (Depth Recorder) fishermen are able to spot the location and approximate number of fish, their

(Continued on page 12)

News of the Institute

(Continued from page 9)

P. James Rich, formerly Director of Research with Mission Dry Corporation, has accepted a special research assignment with Gentry, Inc.

B. W. Nielsen of the Fruit and Vegetable Chemistry Laboratory, Pasadena, was married to Miss Inger R. Lind on September 25.

Officers of the Coe Chemical Company, which is affiliated with the Rexall Drug Company, are P. K. Bates (President) and G. W. Kusserow (Vice-President).

GREAT LAKES SECTION

New officers and committee appointees for the Great Lakes Section, to serve until May 31, 1950, are as follows:

Executive Committee:

Dr. Roy E. Marshall, Chairman, Department of Horticulture, Michigan State College, East Lansing, Michigan.

Mr. James C. Sanford, Vice Chairman, Basic Food Materials, Inc., Vermilion, Ohio.

Mr. Lewis J. Minor, Secretary, The Huron Milling Company, Harbor Beach, Michigan.

Dr. Pauline C. Paul, Treasurer, Home Economics Department, Michigan State College, East Lansing, Michigan.

Also: Mr. R. B. Wakefield, Gerber Products Co., Fremont, Michigan.

Miss E. M. McIntosh, Gerber Products Co., Fremont, Michigan.

Mr. W. F. Robertson, Dept. Horticulture, Michigan State College, East Lansing, Michigan.

Mr. J. W. Conner, Department of Bacteriology, Ontario Agricultural College, Guelph, Ontario, Canada.

Mr. H. O. Way, H. O. Laboratory Service, Cleveland, Ohio.

Program Committee:
James C. Sanford, Chairman
M. W. Alderman
Joseph Adams
Karl C. Envoldsen
Harry O. Way

Budget Committee:
Pauline C. Paul, Chairman
H. A. Barnby
A. A. Roth

Auditing Committee:
C. N. Hinman, Chairman
O. C. Cessna
R. B. Stover

Qualifications Committee:
Paul A. Wolf, Chairman
H. W. Gray
L. J. Minor

Student Membership Committee:
W. F. Robertson, Chairman
H. W. Schoenlein
M. J. Blish

Public Relations and Publicity:
C. G. Barr, Chairman
Parker Frisselle
L. J. Minor

Committee on By-Laws:
R. B. Marshall, Chairman
A. F. Paustian

Membership Committee:
Corville Beauchamp, Chairman
Mary I. Barber
T. B. Calder
F. J. Erickson
E. M. McIntosh
D. F. Dickinson

1952 I. F. T. Convention at Mackinac Island:
Ray B. Wakefield, Chairman
M. W. Alderman
Karl Envoldsen
F. W. Fabian
Roy E. Marshall
L. S. Roehm
H. C. Scott
G. M. Trout

I. F. T. Employment Committee Member:
F. W. Fabian

Abstractor:
Mary L. Morr

Meetings of the Great Lakes Section have been scheduled as follows:

November 4, 1949, 2 p. m.—Battle Creek Country Club.
January 20, 1950, 2 p. m.—Sheraton Hotel, Detroit, Mich.
April 14, 1950, 2 p. m.—Union Bldg., Michigan State College, East Lansing, Mich.

Dr. E. J. Reedman, food technologist of Montreal, Canada, has been appointed Sales Manager for the International Agricultural Corporation, Ltd.

PHILADELPHIA SECTION

On October 20, the Philadelphia Section was addressed by Dr. Elliott Danzig, Philadelphia Manager of Richardson, Bellows & Henry, Consulting Industrial Psychologists. His topic was "Industrial Psychology: What It Can Do for the Food Technologist." He discussed the application of psychology to everyday relationships with fellow workers and how to obtain the most from human efforts.

The Executive Committee met in August to outline plans and offer suggestions to make the Philadelphia Section more valuable to its members. In the capable hands of the Program Committee Chairman, Everett Meschter, the program is sure to shape up to be of benefit to all. A questionnaire was sent out to members with the object of obtaining expressions of opinion from the entire membership so that the Section might work along lines in which there is the greatest interest.

In October, the Philadelphia Section circulated the first issue of a "Newsletter,' the purpose of which is to keep members informed of what is going on. Henry B. Elkind, Jr., of the American Stores Company, is editor of the Newsletter.

At a business meeting preceding the program of the May 12 meeting, the Chairman of the Section appointed an Auditing Committee consisting of Mr. R. H. Morris and Dr. E. F. Mellon, both of the Eastern Regional Research Laboratory.

Chairmen of other committees of the Philadelphia Section are as follows:

Program Committee—Everett Meschter, American Preserve Co.

House Committee—Harry Dessender, Virginia Dare Co.

Publicity Committee—Earl Graham, Crown Can Co.

Employment Committee—Prof. Walter Obold, Drexel Institute.

Membership Committee—John Deppe, American Stores Co.; Henry Elkind, American Stores Co., Co-Chairmen.

Abstracts

(Continued frmo page 10)

speed and direction of travel, and often their species. Because this device has spotted fish where they were not known to exist previously, commercial catches have been greatly increased by boats so-equipped.

PECTIN—JAMS AND JELLIES

370I. Making "liquid fruit" from peaches, apples.

DAVIS, L. L. *Food Pack., 30,* 33, July, 1949.

Apple and peach "liquid fruit" can be made of soft cooked fruit passed through a pulper with a finishing screen of .002 to .030. This puree is homogenized in a single stage milk homogenizer at 3500 psi and in the case of apple, depectinized by addition of pectinase. The homogenized fruit may be made into a sirup by adding sugar, and into jell by adding pectin to the sirup. The pH of apple sirup need not be adjusted for jell making in the home, but commercial manufacturers will want to adjust the pH of both apple and peach sirup for best jelling. The aroma, essence of the fresh fruit, may be added to the sirups or jells at concentrations even exceeding that present in the fresh fruit, thus increasing market appeal of the product. By addition of essence of fresh fruit other than that of the mother fruit, new flavors and combinations may be had.

371I. Three-elements colloid makes better low-solids gels.

BAKER, G. L., CARROW, J. W., AND WOODMANSEE, C. W. *Food Ind., 21,* 617-19 (1949).

Use of Irish moss extractive with locust bean gum and a potassium salt offers a gel compound to the food industry which may be found valuable for the preparation of gelling powders or the less acid canned products such as spreads, salads, and desserts. Unusual elasticity, strength, and form-retaining capacity are imparted to gels to a degree greatly in excess of the effects predictable from the performance of any pair of the three components used independently. The gels made with the three-element compounds have the ability to set without refrigeration, and they may be remelted and reset at will. Canned gelled tomato juice has been found one of the best products made with the new composition.

PHYSICAL CHEMISTRY

372I. The measurement of starch paste viscosity.

BECHTEL, W. G., AND FISCHER, E. K. *J. Colloid Sci., 4,* 265-82 (1949).

The methods described utilized the Corn Industries viscometer and a modified Stormer viscometer. The former provides a continuous record of the change in flow properties during pasting at a controlled cooking temperature; the latter supplements the data obtained during pasting with a rate of shear-shearing stress curve from which the apparent viscosity, expressed in poises, can be computed at any given rate of shear. The measuring methods described are reproducible and characterize the starches with respect both to rate of pasting and the flow properties of a given paste at different rates of shear. Industrial measurements can be made more precise by these means, and discrepancies in standardization and grading can be largely eliminated.

BEST ARTICLE AWARD ANNOUNCED BY ASRE

A monetary award for technical articles on hermetically sealed refrigeration compressors published in *Refrigerating Engineering,* official publication of the American Society of Refrigerating Engineers, 40 West 40th Street, New York 18, N. Y., has been donated by the Spencer Thermostat Division of the Metals and Controls Corp., Attleboro, Mass.

The award, to be known as the "Klixon Award," shall be made for the most outstanding paper published in *Refrigerating Engineering,* on the subject of the electric system of hermetically sealed compressors. While the award is limited to this specific subject, the field covered includes anything which affects the performance or the life of the electric system or its parts.

The award has been announced by the chairman of the ASRE Awards Committee, D. D. Wile, of Refrigeration Engineering Inc., in Los Angeles. The winner will receive an award of $100 for the best paper during the award year which extends from September 1st to August 31st. The contest will continue for a period of five years starting September 1, 1949. If less than three suitable papers are published during any one year, the award will be held over until at least three papers have accumulated, thereby extending the contest until five awards have been made.

The presentation of the award will be made at Annual Meetings of the ASRE which are held in December, and the ASRE Awards Committee will determine who the recipient will be.

Receipt of the Klixon Award will in no way conflict with other awards for which the paper may be eligible.

Book Review

FOOD INDUSTRIES MANUAL, 16th Edition. Edited by T. Crosbie-Walsh. Leonard Hill Limited, 17 Stratford Place, W. 1, London, England, 1949, 1127 pages.

The 16th edition of Food Industries Manual has been carefully revised by various English authorities in each field of food manufacture. The subject material is presented in a convenient, encyclopedic form. A subject index, new with the 14th edition, is an extra aid in looking up information. Sections on cereals, sugar, confectionery, canning and preserving, meat products, pickles and sauces, the dairy industry, dehydration, edible fats and fatty foods, fruit juice products, storage and refrigeration, handling equipment, packaging, boiler house, and composition of foods make a well rounded manual.

The book is presented from the viewpoint of the English food manufacturer, and, as is well known, their practices are not always the same as those in the United States. It is very complete in its subject matter. Certain subjects are considered which are but little known in this country. One of the book's particular values is in its presentation or different approach to food processing and food analysis. Because of these differences and the manner of presenting the subject, the reviewer believes that the manual may be a worth-while addition to the technical library as a ready reference.

C. S. PEDERSON.

THE UNITED STATES AS THE MAJOR MARKET FOR CANNED TUNA

In the early thirties New York City was the chief center of consumption in the U. S. A.,, which as a country constitutes the only important world market for canned tuna. The major regions where a demand for American-style canned tuna exists are along the Atlantic coast states, Pacific coast states, and in certain urban centers of the Middle West. With the decline of a large foreign-born minority, the relative importance of specialty packs might decrease.

The speculative nature of tuna fishing and the necessity for highly experienced crews and expensive craft and gear to catch the fish makes the cost of the raw material by far the most important item entering into the cost of the final end-product. Canned tuna is a high-cost food and large markets for this product can only be developed in countries where consumer income levels are high.

In the U. S. A. it is considered by some authorities that meat is the closest substitute to tuna and in comparative price studies attention is to be given between meat prices and those for tuna. It will, however, also be necessary to pay attention to an analysis between tuna and salmon prices.

The American-style pack of canned tuna was unknown before the experiments started during the first decade of the 20th century. The market for canned tuna which has expanded so rapidly in the U. S. A. really began to be established from 1914 onwards when experienced marketing firms began producing and selling the product throughout the country.

The consumers' market for canned tuna in the U.S.A. obtains supplies from the following sources:

1. Domestic production of canned tuna from:
   a. Tuna caught and landed by U. S. craft and fishermen;
   b. Tuna imported in a fresh or frozen condition from foreign primary producers.
2. Canned tuna imported from foreign countries processing their own tuna.

The percentage of the canned production of foreign-caught materials to the total canned output rose from 2 percent in 1925 to 10 percent in 1929, and after a decline to 8 percent in 1930 rose again to 13 percent in 1931, on the basis of computations by the U. S. Tariff Commission. In considering the percentage figure for 1931 it is to be borne in mind that in that year there was a sharp decline in the domestic landings of tuna.

Imports of fresh and frozen raw materials are of minor importance in comparison with imports of canned tuna; the latter have a more definite influence on the percentage composition of total supplies. As a result of a large import of canned tuna in 1933, the total contribution of imported fish amounted to 38 percent of total supplies. In 1934-40, with the increase in U. S. production in both landings and canned tuna, together with a leveling off of imports to between 3,000 and 5,000 metric tons, the total contribution of imports to total supplies fluctuated between 11 and 22 percent. In 1941-48 imports of fresh and frozen tuna, as well as canned imports, dropped and, therefore, the percentual contribution of total imports, on the basis of the computations, declined to fluctuate between 2 and 9 percent. These figures show the comparatively insignificant role of imports during the late thirties and the war years as compared with the situation existing during the early thirties. — F. A. O. Fisheries Bulletin, July-August, 1949.

ASRE ISSUES 47th AD SECTION ON REFRIGERATION CONTROLS

The American Society of Refrigerating Engineers has issued its 47th Application Data pamphlet entitled "Refrigeration Controls."

AD 47 contains data on the construction and application of different types of valves and switches used for refrigerant control. The pamphlet is divided into sections and each section explains the function and operation of the following:—automatic expansion valve, thermostatic expansion valve, high side float valve, low side float valve, float switch, evaporator pressure regulator, liquid stop valves, suction stop valves, and injectors and pumps, which are used to obtain complete evaporation of liquid refrigerant in an evaporator.

Williams P. Myers Jr. is the author of this pamphlet and is an application engineer with Alco Valve Company.

Copies may be obtained from ASRE headquarters, 40 West 40th Street, New York 18, N. Y., for 45 cents each.

F. A. O. HERRING MEETING—TECHNOLOGY DISCUSSED

An intergovernmental meeting convened by FAO took place at the Hague, 29 August-2 September. With the Netherlands Government as host, FAO brought together representatives of the major fishing countries of Europe and North America to discuss economic problems related to the production and distribution of herring and allied species. It was decided at the meeting not to take up questions dealing with the European sardine industry.

Belgium, Canada, Denmark, Finland, France, Iceland, the Netherlands, Norway, Sweden, the United Kingdom, and the United States of America, as well as the Economic Commission for Europe and the International Council for the Exploration of the Sea, were represented.

In examining biological and technological factors influencing herring production and the many processes used in its preparation, the meeting placed emphasis on the economic problems of the industry. The loss of many traditional markets, the decline in consumption of herring in certain forms, particularly salted herring, and general trade barriers disrupting international trade were among the topics discussed. The meeting recommended that market research should be carried on through the FAO secretariat in regions where herring by tradition form a part of the diet. It was further recommended that studies should be made of potential market outlets such as Asia and Africa. As

one of the steps in this direction it was recommended that a study also be made of possible methods for processing herring into a form more acceptable to the consumer in these potential markets. It was suggested that FAO consider calling a meeting of fisheries technologists next year to continue an examination of processing methods with a view to encouraging new techniques.

A full report of the meeting is now being prepared and will be available shortly.—*F. A. O. Fisheries Bulletin*, September-October, 1949.

EFFECT OF STORAGE ON QUALITY OF FROZEN FISH

Research at College Park, Md.

After 8 months of storage, the striped bass fillets held at a constant temperature of —10° and 0° F., and at temperatures fluctuating between these two points received satisfactory scores. The scores were essentially the same for the three groups. The appearance and odor in the frozen state were still satisfactory. After thawing, however, a rather fishy odor was apparent. The color, though not as bright as for fresh fillets, still had not become objectionable.

The samples held at a constant temperature of 15° F. and at temperatures fluctuating between 0° and 15° F. had decreased considerably in quality and definitely would be unsalable, with the latter receiving the higher scores of the two lots. Though not so noticeable in the frozen state, the fillets after thawing had a strong fishy odor and were very noticeably discolored. The discoloration does not seem to follow any particular pattern, however, and may be dark, a very flat light color, or have yellow streaks, as sometimes found with fatty fish after a period of storage.

Volatile acid numbers (state of freshness) have increased very little over those for the sixth-month period. It was interesting to note that, while probably not statistically significant, the number for the samples undergoing fluctuating temperatures between —10° and 0° F. falls between the numbers for samples held at a constant temperature of —10° F and constant temperature of 0° F. A similar condition had occurred with the samples held at 0° and 15° F. and fluctuating temperatures between these two points.

* * * *

The frozen fish covered with different wrapping and glazing combinations had changed very little in quality after four months of storage. The fish which were wrapped before freezing and not glazed were showing very slight but almost negligible surface drying.—*Commercial Fisheries Review*, September, 1949.

HOW TO JOIN THE INSTITUTE OF FOOD TECHNOLOGISTS

The procedure for joining the I. F. T. is as follows:

1. Fill out an application blank.

If the applicant resides within the area covered by a regional section, the application form should be obtained by writing to the Secretary of the section. These are listed, with addresses, on the second page of each issue of FOOD TECHNOLOGY. If the applicant resides far from the headquarters of a regional section, the application form should be obtained by writing to the Secretary of the Institute, Suite 954, 222 West Adams Street, Chicago 6, Illinois.

The application blank calls for information regarding the training of the applicant in the field of food technology. Since the question of qualifications is important, it is necesary to obtain the endorsement of three Members. If the applicant is not acquainted with three persons whom he knows to be Members of the Institute, he should ask the person to whom he writes for the application blank to give him the names of several Members in his locality, to whom he might become known.

2. Send the completed application to the office from which the blank was received.

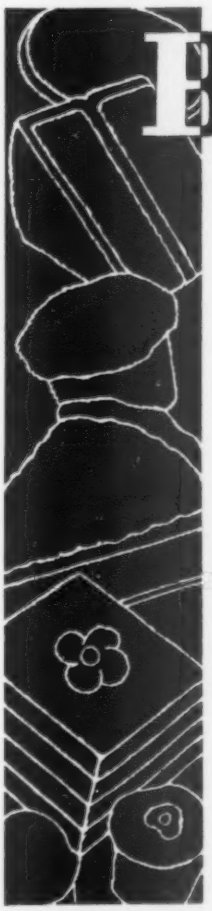
If the application is submitted to the Secretary of a regional section, it is first referred to the section Committee on Membership Qualifications and then sent with the recommendations of that committee to the Secretary of the Institute. The Secretary submits the application promptly to the Institute Committee on Membership Qualifications, which makes a recommendation to the Council as to the type of membership to which the applicant is entitled on the basis of his qualifications. The Secretary secures action by the Council and reports the results to the applicant and to the Secretary of the regional section.

If the application is submitted by the applicant directly to the Secretary of the Institute, the procedure is as described above, following the receipt of the application by the Secretary. In such case, however, if the applicant resides within an area covered by a regional section, the first step of the Secretary upon receipt of the application, usually is to request a recommendation from the Committee on Membership Qualifications of the section.

Your 1950 Membership Dues

1950 membership dues are payable on or before January 1st. Statements were mailed to all members early in November. If you have overlooked sending in your remittance attend to it TODAY.

The Executive Committee of the Council has directed the Secretary to "send a second notice to all delinquent members on January 1st, and to stop Journal subscriptions to those who have not paid by that time. If payment is received after the stopping of a subscription, back issues of the Journal will be furnished only at the current sale price of 75c per copy."



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